

WINTER RICHES,  
OR A  
MISCELLANY of RUDIMENTS,  
Directions and Observations,  
Necessary for the laborious FARMER,  
ON A  
New VEGETABLE SYSTEM of  
AGRICULTURE,  
On Principles of FACT and DEMONSTRATION:  
Whereby  
EASE and PROFIT may be obtained, and the willing  
FARMER become a HUSBANDMAN.

---

BY MATTHEW PETERS, K  
Member of the Dublin Society for the Encouragement of  
Husbandry, and other useful Arts,  
And  
AUTHOR of the RATIONAL FARMER.

---

L O N D O N:

Printed for W. FLEXNEY opposite *Gray's Inn, Holbourn.*  
M,DCC,LXXI.





TO THE  
MOST NOBLE  
THE MARQUIS OF  
ROCKINGHAM,  
A LOVER OF HIS COUNTRY,

THIS TREATISE ON AGRICULTURE  
IS MOST HUMBLY INSCRIBED,

BY

HIS LORDSHIP'S MOST OBLIGED,  
AND MOST DEVOTED

HUMBLE SERVANT,

MATTHEW PETERS.

TO THE

MOST NOBLE

THE M.A.S.C. 1845

BOOKINGHAM

A NOVEL OF THE COUNTRY

THE TALENT OF THE COUNTRY

IS NOT A LITTLE

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THE TALENT OF THE COUNTRY

AND NOT DEVOTED

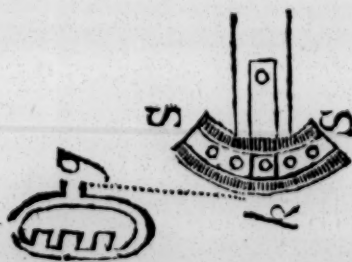
THE TALENT OF THE COUNTRY

MATTHEW BATES

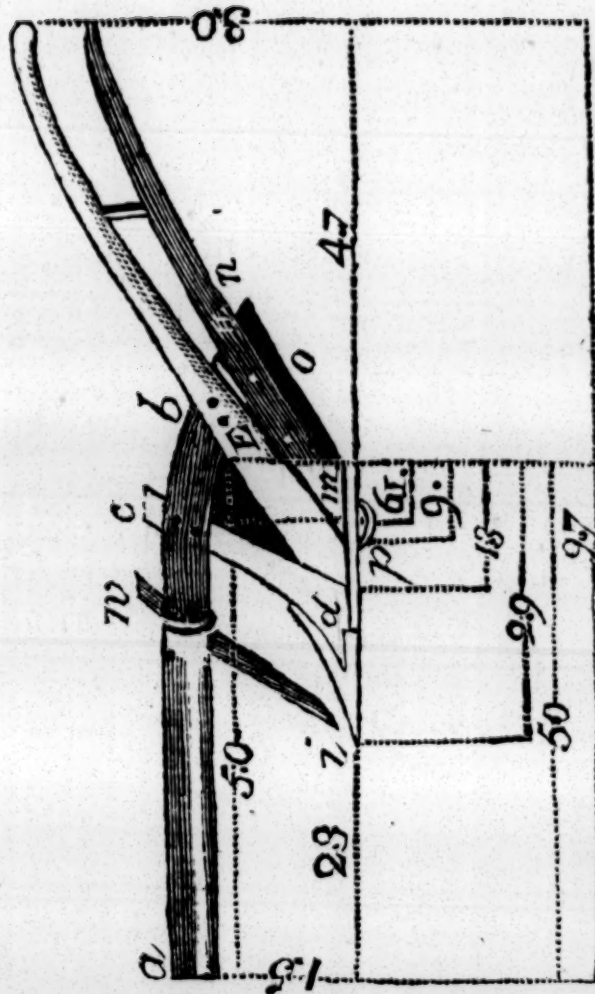




# The LOMAX PLOUGH.



- a, b,* The beam.
- c, d,* The sheath.
- E,* The main handle.
- m,* Head piece.
- n,* Small handle.



*g,* The friction wheel, appearing at the sole of the plough.

*w,* Coulter with the fly-band.

*i,* Sock or share into which the sheath runs.

- o,* Mould board.
- p,* The friction wheel, appearing at the sole of the plough.
- w,* Coulter with the fly-band.
- i,* Sock or share into which the sheath runs.

*g,* The friction wheel, appearing at the sole of the plough.

*w,* Coulter with the fly-band.

*i,* Sock or share into which the sheath runs.

*A Description of the LOMAX PLOUGH.*

Note. There are two shares for this plough; a nose or pointed share for stony land; and a round share for land not stony. See *Norfolk share*, *Rational Farmer*.

*m* Head piece, a right angled triangle, whose base and perpendicular sides, are equal to 9 inches each, and 3 inches thick, oak timber.

*E*, Main handle lying on the head piece, to which it is pinned with two pins, ash timber; and forms an angle of 45 degrees.

*d*, The sheath, pointed to receive the socket share, the edge from thence to the beam feathered off, to which the mould board joins, which is plated with iron.

*i*, The socket share with a land side strap, fastened to *d*, *E*, *m*.

*o*, Mould board, fastened to the sheath, and kept at a proper distance at *m*, by a strut pin through *m*, and the other end through the mould board, and another strut pin through the main handle and board, higher up.

*n*, Smaller handle pined to the mould board. The bottom of *d*, *E*, *m*, as well as the bottom of the mould board are strengthened with iron.

*a*, End of the beam, to which a round horizontal head, *f*, *f*, is fastened with a thin plate of iron, through which are holes for an iron pin to go, to form the perpendicular bridle *g*, so as to throw the plough more or less to land; playing

on a pin which runs through the bridle strap and beam. The notches in the bridle sets the plough more or less into the ground. Except the head piece, all the other timber parts are ash.

*p*, Part of the wheel fixed in the chamber or inside of the plough, being 2 inches broad and about 2 inches below the sole of the plough, takes off all the horizontal friction from the bottom of the furrow. The diameter of the wheel should be as large as the chamber will admit, as the ease to the draught will be in proportion; and the breadth of the wheel will prevent its cutting into the earth, which otherwise would (as is the case of the common two wheel carriage plough) thereby retard the draught.

A small rolling action to a plough may be seen at the Society of Arts, &c. in the *Strand, London*; but its not being fixed in the centre, nor of a sufficient diameter, its use is of little worth.

This wheel's utility is put in practice by a gentleman with much approbation; and I look on it as one of the greatest advantages the plough has received; and, as elsewhere observed, of the greatest utility when applied to a simple light structure. But think its merit is lost in an expensive, complicated, useless and weighty piece of plough machinery.

Note. The only fault in this plough, is, that the beam should be four feet long instead of five feet.



TO THE  
P U B L I C.

THE kind reception the *Rational Farmer* has met with from the discerning part of husbandmen, and the indulgence it has received from gentlemen of the first abilities in literature, arts, and science, are flattering circumstances.

However, I cannot flatter myself that I am deserving of the merit imputed to that treatise, although it proceeds from such impartial disquisitions.

In return, can only observe, that my endeavours are well meant; the intention of that small treatise on agriculture, was, as a prelude, or hints for some more musical Georgic, to sound the soft air of vital agriculture in a more masterly manner.

b

But

But as duty and love for my country first moved me to send into the world a few instructive sentiments on a new vegetable system, so public approbation, commanding obedience, stimulated (as it were) my pen to offer to the candid husbandman, an enlargement of this rational and profitable system, to make more fertile and permanent the blessed earth, from whence alone every good, comfort, and joy, must proceed.

Thus, *Winter Riches*, like the *Rational Farmer*, plead to be heard by the benevolent admirers of uncontroverted utility.

TO THE  
R E A D E R.

**T**HE Author, in his *Rational Farmer*, set forth the profit arising from feeding hogs on clover, &c. in summer, together with the advantage land receives thereby from the dung of pigs feeding thereon; with many other salutary instructions to improve land, at a less expence than the common mode.

In this miscellany of *Winter Riches*, the author has opened a tract of winter advantage, nearly equal with summer plenty; viz. feeding hogs, horned cattle, horses, &c. on winter roots, with remarks on some injudicious practices relative to the manner of feeding sheep on turnips; a dissertation on the red worm, with a sure method of destroying them; an easy and effectual method of curing horned cattle, sheep, &c. if hoven with clover,



clover, or other green food ; with many interesting instructions and remarks.

It equally concerns the farmer and grazier, in providing vegetable food for all sorts of cattle in the winter, to make that gloomy season vie, as it were, with summer's pride.

If the husbandman can keep his cattle during winter up to a state the summer has raised them, he thinks it well ; but if such cattle can be so improved in winter, to nearly equal the summer's enlargement, surely it is better. The horse can be improved in the stable, the hog in the sty, and why not the ox, the cow, and the pig, in the yard.

But while the author is thus endeavouring to promote emulation, remove stumbling blocks, and make an old, rotten, narrow road, open, smooth, and spacious, he is aware of the old leaven ; the ignorant cannot away with a supposition of being not thought perfect ; instruction to such wretches, is arraigning their judgment. But let me tell that self-sufficient obstinate mule, who e'er he be, that he is the lowest of God's creatures, the lowest of the reptile species ; and, to make use of a scripture phrase particularly pointed to such,  
it

it is, " casting pearls before swine " to attempt to instruct them.

However, the wise and discerning man, whose eyes are always open, and his heart ready to receive every gift of advice, must not be neglected, or suffer to trample in cloggy clay, or be kept like a trammel'd horse ; to such the author further addresses himself, being animated with hopes, that a second mite cast into the world's stock, may be useful ; therefore, his intention is to treat on such subjects as may be necessary to inform the husbandman in many material things, who must not think that there can be any perfect system laid down, whereby a man is to receive all knowledge: no, agriculture is such a field of science, such an area to be traversed, that new discoveries will be found till time shall be no more. God help the weak animal, who calls himself a farmer, who thinks he knows all things, when really his knowledge is only as one sand is to all the sands in the world, comparatively speaking.

The author hopes, that the candour of his intentions, will plead, in excuse, for manner and inelegance of style ; adding, that whatever useful observations may have occurred since his publication

tion of the *Rational Farmer* (in tillage) is here set forth; the principal part of which is founded on the knowledge of the author, either from his own experience, or known effect with others.

This being brought into, or reduced to a recommendatory practice, is therefore by no means ideal, but as much a practical performance as if it had gone through a regular process of years with any one man.

Where aid was wanting to illustrate some material matters, the author has had recourse to the most distinguished writers, both antient and modern.

Of these *Camello*, *Pliny*, *Virgil*, *Columella*, &c. in agriculture, and the elaborate chymist *Glauber*, who shines first in that refining art.

The reader may perhaps ask, What has chymistry to do with agriculture? He must be told, that on the knowledge of that art, a great part of tillage depends, as well as on the knowledge of the principles and powers of mechanism.

Hence the author refers to what the ingenious doctor *Home* says, in his *Principles of Agriculture and Vegetation*, p. 2. to 8.

“ The



“ The slow progress of husbandry may be accounted for from obvious reasons. This art is, in general, carried on by those whose minds have never been improved by science, nor taught to make observations, or draw conclusions, in order to attain the truth ; or by those who, although nature has been very bountiful, cannot carry their schemes into execution, from the narrowness of their fortunes. The former can never know more than they have learned from their fathers; the latter, dare risk nothing, as their daily bread depends on the certainty of success.”

“ Agriculture, although it depends very much on the powers of machinery; yet, I will venture to affirm, that it has a greater dependance on chymistry: without a knowledge in the latter science, its principles can never be settled. As this science is but of late invention, and has not yet been cultivated, with that regard to utility, and the improvement of trades and manufactures, as it ought and might, agriculture is hardly sensible of its dependance on it.”

“ The just theory of an art leads directly to its improvement, as it leads to those experiments which remain to be tried. Without this guide,

we

we may stumble on truths by accident ; but, when led by it, we have the secret satisfaction of thinking that we are indebted to ourselves for the happy issue of the experiment."

" The operation of bodies are to be accounted for only from their known qualities ascertained by experiment ; reasoning on any other plan, can certainly never lead to truth."

" Agriculture does not take its rise originally from reason, but from fact and experience. It is a branch of natural philosophy, and can only be improved from the knowledge of facts, as they happen in nature. It is by attending to these facts that the other branches of natural philosophy have been so much advanced during these two last ages. Medicine has attained its present perfection only from the history of diseases and cases delivered down. Chymistry is now reduced to a regular system, by the means of experiments made either by chance or design. But, where are the experiments in agriculture to answer this purpose ? When I look round for such, I can find few or none."

Thus much the doctor.

The

The benevolent heart will apologize for small publications, knowing that such can make their appearance in the world, and successively inform, whilst a volume may be compiling near a man's life before it enters on the stage to instruct.

The use of publications is to instruct and acquaint man with matters; who, by his situation in life, has not had an opportunity of improving himself beyond the narrow sphere of his little neighbourhood, and to give hints to the more enlarged genius's to improve on.

The author flatters himself, that the goodness of the subject, will, in some measure, atone for the publication, as faithfulness and judicious lines, are the true spirit of information.

And indeed, in most books, in one respect or another, something will be found good and useful. The elder *Pliny* used to say, there was no book so bad, but some good may be had from it: and *Virgil* could gather gold out of *Ennius's* dunghill. *Hook* observes, that the difficulty in choice of books, is not so much what to take, as what to reject.

It may be added, that as knowledge is naturally advantageous; and as every man ought to be



in the way of information, even a superfluity of books is not without its use, since hereby they are brought to intrude themselves on us, and engage us when we had least design. An ancient father observes, every thing that is written, does not come into the hands of all persons ; perhaps some may meet with my books, who may hear nothing of others which have treated better on the same subject. It is of service therefore, that the same questions be handled by several persons, and after different methods, though all on the same principles, that the explanation of difficulties, and arguments for the truth, may come to the knowledge of every one, by one way or other \*. That the multitude is the only security against the total loss, or destruction of books ; it is this has preserved them against the injuries of time, the rage of tyrants, the zeal of persecutors, and the ravage of barbarians, and handed them down, through long intervals of darkness and ignorance, safe to our days †.

N. B. If

\* August, de Trin. l. 1. c. 3.

† Bartholin. Diff. 1. p. 8. & seq.

N. B. If any expressions in this treatise seem harsh to the farmer, they are not meant to offend; however, it can be to those only who refuse instructions: to such, if the cap fits, they have the author's liberty to expose themselves, by the signal of wearing it. The judicious improving husbandman will not deprive such, if such there be, from enjoying that emblematical figure.

Through this treatise, similar applications have been attended to on the various subjects, tending to restrain or enforce the practice; and although such may be a little out of the mode of usual publications on agriculture, yet the author doubts not of its meeting with approbation, suitable to his intentions.

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# E R R A T A.

- P. 48. l. 2. *read* 20 tons.  
 49. opposite potatoes, *read* 20. Same p. instead of  
 396, *read* 406.  
 54. in the note, *read*, from 10 quarters to 12.  
 84. last l. in the note, instead of brain, *read* bran.  
 126. l. 17. *dele* the comma after Gilead.  
 158. l. 6. after rook-worm, *read*, as rooks attend the  
 ground.  
 185. l. 13. *read*, less accomplishments.



*Just published.*

And sold by W. Flexney, in Holbourn.

The RATIONAL FARMER, or a TREATISE on AGRICULTURE and TILLAGE; Wherein many errors of common management are pointed out, and a new improved and profitable System suggested and described; interspersed with many occasional and interesting observations: SECOND EDITION. To which are added, some useful Notes; together with a short Essay on the Dearthness of Corn, and other Provisions. By MATTHEW PETERS.

The following Characters are given of this Treatise.

*Monthly Review* for October 1770, p. 322. The RATIONAL FARMER, &c. The many sensible observations contained in this Tract, are sufficient to justify the title assumed by the author, who appears to be himself an attentive, reflecting practiser of the art which he here undertakes to teach to others.—I hope, says he, p. 76. our observations thus far agree with the character of the Rational Farmer, proceeding on experience, and consulting his interest; an interest which, while connected with the social virtues, he cannot be too assiduous to cultivate.—While many occupations tend only to useless splendor, or lazy pride; the farmer, in every instance of his diligent employment, is a public benefactor, and confirms the truth, “Self-love and social are the same.”

The remark that the diligent farmer or husbandman is a public benefactor, is undoubtedly just, and will be universally assented to, although every man may not happen to think of him so highly as Cowley does; who, as here quoted by Mr. Peters, observes, that “the three first men in the world, “are a gardener, a husbandman, and a grazier.”

*Town*

*Town and Country Magazine* for December 1770, p. 622.  
The Rational Farmer, &c. Mr. Peters understands his subject, and has made several pertinent remarks upon rural improvements and agriculture.

*Critical Review* for November 1770. Rational Farmer, &c. Mr. Peters appears from this treatise to be a man of sense and reflection; he delivers his observations in a manner becoming a Rational Farmer, whom we shall always consider as a benefactor to the public.

*London Magazine* for November 1770. Rational Farmer, &c. We have repeatedly observed, that few books are calculated to advance the public prosperity more than books of agriculture; and it is but justice to say, Mr. Peters deserves a very reputable mention in the catalogue of these useful writers.

---

*Where also may be had.*

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Evil, 8vo

# WINTER RICHES.



## CHAP. I.

### SECTION I.

**T**URNIPS being the most edible root known to the farmer in the field, I shall begin with mentioning the sorts fit to be cultivated for that purpose.

1st. The common red flat turnip; 2dly, the round green turnip; 3dly, the Norfolk turnip; 4thly, the red and white tankard turnip.

The two first sorts grow much covered in the ground, and are mostly cultivated in the southern and western parts of England; but in the east and northern parts, the other two sorts are chiefly cultivated, as being, by their manner of growing, best adapted for sheep, where due attention is paid,

B

in



in particular the latter, which grow intirely above ground, and only a small tap root to support it.

The advocates for the two last, say, that the first and second sorts being so much covered with, or flat on the earth, they cannot be eat so well standing in the field, because the earth soon interrupt the sheep in their feed, and what they leave uneat, a heavy dash of rain beats the earth into the uneaten part, and renders them unfit for further use in that situation. The shepherd then comes with his sagacious countenance, and with fork, or hoe, drags out the remaining part with much earth also sticking to them; compelling the poor sheep to eat this dirty morsel or starve; not considering the injury such food does to their teeth: It were a pity but that such were compelled to eat gritty bread.

The Norfolk turnip has less of this objection attending it, as they grow more out of ground than either of the two first; but the tankard has not any offence of this kind, as all the eatable part is above ground, of an oblong shape. The third and fourth sorts are also of a closer texture, and finer grain, by growing in the air, than those which grow in the earth, such being more watry, coarse, and spungy.

If

If turnips are designed even to be drawn and carried either home for black cattle in the stall, yard, or to sheep in the pasture field, still the tankard has the advantage; for when the small root which runs into the ground is cut off, the eatable part is as free from dirt as the two first sorts washed in running water; the cattle can chew them freely, and of course eat a greater quantity; a property much in their favour.

If the husbandman would but reflect on the delicate feeding of horses, horned cattle, or sheep, how dejected they appear when gritty food is given them! would but observe the horse when such food comes within his teeth, the scrunch strikes him as it were with numbness! would consider how they avoid the naucious weed, or sour grass, unless oppressed by hunger,—he would, I am sure, join with me to avoid such errors, would cultivate and give only such as good sense dictates.

## SECTION II.

### *The Cultivation of TURNIPS.*

TO expect a crop of turnips for the uses mentioned, claims the best tilled land. This part of winter riches may be one of the rotational changes for the culture of wheat, or barley; that  
after

after your pockets have been filled with a fix or ten years progression of corn, and pigs, see *Rational Farmer*, page 53, 54, this root may be indulged in its turn, with its enlivening property; that not only the sun-shine art of keeping land perpetually in the highest tilth of agrandizing bounty, but also make winter smile with pompous summer.

Various are the seasons for sowing turnips to make them of that utility their merit intitles them to. Why should turnips be thought an improper food for sheep in summer? Did you ever know or hear of any fatality happening to sheep by eating turnips in summer? One would even imagine it to be so by its silence at that season. Will you tell me that sheep, kept on the short pasture they are generally kept on, and just stole as it were into clover to take a few bites, and then withdrawn for fear of bursting with fermented wind\* (in particular when the clover is wet) would not be better if penned on dry land of turnips sown on a summer fallow, and there kept in the morning, rouzed often about to oblige them to dung longer than usual, until the sun had exhaled the dew, and then remove them thence into the clover.

\* If this should happen, they may be stabbed, as mentioned under the article of Hoven Cattle, chap. 7. sect. 1.



Under this circumstance of bodily prominence, by their nocturnal food in the penn, would they eat so greedily, or endanger the complained of mischief: on the contrary, the sheep are sent into this luxuriant food, from a dried up pasture, or scorched common, with a ravenous stomach swallowing the food whole without chewing; by which improper custom, the use of such change of pasture food is intirely and perniciously reversed.

Tell me, I say, what is a summer fallow baking in an inactive state, to the fructifying crop of turnips, rape, or some other luxuriant vegetable, eat off with impregnating dunging sheep? the land immediately twice scarified\* and harrowed, or lightly ploughed with a diligent man, light plough, and two horses only, to cover the treasure a grateful flock has left behind for an ensuing crop of wheat. I should be glad to receive a rational answer, and should be glad to be set right, if wrong, in so material a question.

As turnips for this purpose should be sown the end of April, or beginning of May, as soon as you see a shower offering itself, sow a thick crop of turnip seed, with one pound of raddish seed to

\* An utensil for scarifying land.

every four pounds of turnip seed. Sowing radish seed with turnip seed diverts the fly from the turnip, if such should come among them; the seed leaves of the radish are much larger, soft, and sappier than the turnip seed leaf, and continues so a considerable time, so that whilst the fly is regaling on the luxuriant radish leaf, the turnip escapes their ravage; this has often saved large fields of turnips, and is worthy notice.

Let me hint to the farmer to roll his turnip ground the instant the seed is sown, as well as frequently afterwards in the evening after they are come up when the dew is fallen, if the weather should be inclinable to drought or the land light. It is at that time the flies make their appearance and comes out of the cloddy cells to prey on the infant plant: the roller destroys innumerable, and every other night disturbing them, as well as making the surface close and firm, prevents their harbouring in rugged ground; it also prevents the darting sun-beams from exhaling what little moisture may be in the earth for the hasty plant's nourishment.

\* It will be of double advantage to the land to pen twice in twenty-four hours; sheep will always fill their bellies in two or three hours in clover, turnips, rape, &c.

This

This crop of turnips will come into feeding profit the beginning of July or sooner, according as the weather may prove more or less favourable ; from thence through August (by sowing one half not till the middle of May) will your sheep be plentifully fed on no loss of ground, or fields taken up from other uses, and be supported thro' the two scorching months of pasture trial. When sown for this purpose they are not to be hoed.

This may be thought digressing from winter discourse, as the plant I am speaking of is more properly a winter vegetable : but I crave permission to speak of it in a double capacity, and beg the reader to understand, that instructing digressions are allowable, and commendable illustrations, when they do not deviate too far from the matter treated of.

I come now to the season for providing against inclement weather, and securing thereby winter food, of which this plant stands among the foremost.

For winter supply, all the turnips should not be sowed at one time : if the land be inclinable to moisture and coldness, such should be sown the middle of June : if dry and warm, from the beginning of July to the middle of August, at three different



different times : the first sowing about the beginning of July, one fourth of the ground. The second sowing about the middle of July, one half. The last sowing between the middle of July and the beginning of August, the remaining fourth part. From these different sowings a man need never fear of having a middling crop, if not a full one, sowing radish seed each time as before mentioned.

Supposing a very dry summer ensue, or other mishap befall them, so that they appear thin, which will be discovered by the time of the first hoeing, seed may then be scattered over the intervals, which will be covered in hoeing the turnips ; and the second hoeing will set all out at the proper distance of ten or twelve inches, if the ground be good.

Although penning of sheep is almost known through England, yet I shall take the liberty to observe, that penning of sheep on wet land, or in wet weather even on dry land, in winter is bad husbandry : They not only injure their wool by lying on wet, dirty ground, but the turnips are much dirtied and made disagreeable to the sheep in eating them ; the leaves are also easier trod into the dirt, and the roots made filthy by trampling on them ;

them; to which add, the injury done to their feet in such mortared ground.

Turnips in wet land should be carried from thence to a dry pasture that may require manuring; there penned regular as in a turnip field, having first scarified the pasture cross-ways, not up and down, if the field should lay on a descent; sowing it at the same time with common grass-seed; much of which will go into the cuts made with the scarificator, which receives also the sheep urine, and much of their dung also is trodden in; moss destroyed if any, and the soil deeper enriched by these innumerable small cuts made with the scarificator†: observing to cut off the dirty root of the turnip as they are drawn up, that no part of them, or their leaves may be dirtied.

Thus, the sheep will be kept husbandman like; turnips given clean and eatable; baneful moss destroyed by scarification, and edged hoof of the sheep; and the land highly fertilized.

To ascertain nearly the quantity of turnips which ought to be given to sheep penned on pasture, so that they may have enough, and not too large a quantity left to blow on; it may not be improper

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to

† See its description Rational Farmer, page 47.

to acquaint the farmer, that sheep will eat from fifteen to twenty-four pounds in twenty-four hours; a sheep that weighs twenty pounds a quarter will eat upwards of twenty pounds weight of turnips in that time: thus by a man's care in weighing a square perch of his turnips, he will know near how long, and how many sheep his turnips will feed.

However, take care not to stint them of good food, lest you hereafter say, that feeding sheep on pasture in a penn, or bullocks in the stall with such food is pernicious given that way; and so by starving, or stinting them pass an unjust sentence, which has in some similar cases been done.

If the land be dry where winter turnips may be sown, and the sheep penned on them, it is the best method to turn the sheep out of the fold on that part which has been fed off, and there to remain until they are penned again in the afternoon; by this method the land has all the advantage that penning is designed for.

I say, until penned again in the afternoon, not evening; because they are in this situation kept from any other food, from the time they are let out of the penn, till they are penned again.†

But

† They are to have large room in the penn, and let out about five hours.



But further. You may remember in a few lines past, mention was made of keeping a summer fallow (as so called) under a crop of turnips, rape, or some other vegetable for sheep; I must here add, that where a farmer has a stock of sheep, he cannot follow any system so profitable to his flock, or more enriching to land. A fallow should never lay at rest. In fact, 'tis a term in farming that ought to be abolished, it is a baneful word in that noble science: for land should always be producing, and judgment always manuring; and where good sense governs, there can be no interval in either, when the land is cleared of quitch, or couch grass as some call it.

For instance, after a crop of any sort of grain, where the land is intended for barley, or to lay waste, and under a summer fallow; plough such up as soon as the crop is taken off the field, sow it with rye† and barley, or rye and black oats. In February or March following, put in ewes and lambs, or a larger stock, according to the quantity thus sowed, which will keep growing as it is eat down, till May; at which time, plough it up and sow the same land with rape, turnips, buck-wheat,

† Rye is a good crop for coarse dry land.

wheat, or vetches, pretty thick; either sort of these will be fit to feed off by penning, or to be ploughed sometime in July, or beginning of August; after which, you may, with one ploughing more, sow wheat for the next crop.

Again, if you don't want a feeding crop in the spring until March, or April, rape may be sown the beginning of August instead of rye, &c. and then pursue the summer with either of the other above mentioned.

Also, if neither of the vegetables mentioned should be wanting for sheep, black-cattle, horses, pigs, &c. plough them in for manure, as often as they are here mentioned to be produced, in a rotational change; feeding, or ploughing, in whole or in part, according as they may be wanted.

Shall I request the man who calls himself a farmer, to divest himself one moment, and uncover himself from that worn out, rotten threaded garment of perverseness; and consider the advantages arising from, first two crops of food, and two manurings with sheep dung, and only three ploughings. Or, secondly, two manurings of vegetables ploughed in, one growing on the upper surface

Note : Rape, is sometimes called cole ; and vetches, tares.

surface impatient to be ploughed in, to do its office of putrefaction in the earth, (keeping therein all its native salts without evapourating, or exhalations diminishing any of its fertile, oily juice) as what was just before ploughed in, was doing. Or, thirdly, feed one vegetable crop off, and so manure with the dung of the aiding flock, and plough in the other crop.

If a ploughman can stand this without conviction, and contrition, a husbandman can not; I put this, a test of distinction, that whoever he may be, however implicitly following the odious scent, if this fragrant breeze, if this refreshing perfume of profit will not draw his footsteps to the fountain of propriety, I must pronounce him an incorrigible being.

### SECTION III.

*On feeding HORNED CATTLE with TURNIPS† during the winter.*

**A**Lthough feeding horned-cattle with turnips &c has been much used, yet no one but Mr. Baker (that

† Duhamel, and every person I have conversed with of experience agree, that hogs are very fond of turnips, and that they agree well with them; Mr. Young is the only dissenter in opinion.



(that I have read of) has given a culculation of consumption, whereby a man may adjust before he begins, what an acre of turnips will do. He says, " I have fed a cow this winter, and I have now " two bullocks which are stall-feeding upon turnips also: it is computed that they weigh between four and five hundred weight each; and " I find by experience that they eat about 216 " pounds each in twenty-four hours, which is, " therefore, about half their own beef weight: " from hence we may with reason imagine, a beast " will eat every day of turnips at stall-feding about " fifty-six pounds, for every hundred weight of " beef he may contain."

Mr. Baker says, " That he put up a bullock miserably poor (this I can readily believe as I know the poverty of his land) from the plough for an experiment on the 14th of December, he took kindly to the turnips, and on the 16th, he gave with his turnips eight pounds of pea-meal every day, and found that he greatly improved: and is inclinable to believe that if he had put up the bullock six weeks sooner, in April, he would have been good beef."

He observes, " that when he puts the cattle first to turnips, they dung but little, the turnips going off

off chiefly by urine, the quantity of which is really incredible: he allows seven pounds of hay every day to each, but does not find that they eat fewer turnips on that account."

To each of his store-cattle and cows, he allows seventy-two pounds of turnips a day, and thirty-six pounds of straw to a moderate sized beast. To his plow bullocks he allows the same quantity of turnips with as much straw as they can eat, which they are first to feed on for half an hour after they are unyoked, before the turnips are given them, for fear the turnips should be too cold immediately after their warm labour."

"That he fed a milch cow four days on nothing but turnips, but could not find any disagreeable flavour in her milk from that food†."

A gentleman of my acquaintance fed many milch cows a whole winter on turnips at night, and a little hay in the morning, before they were turned out on pasture, or rather to air or tumble, instead of eating grass; yet, no complaint was made of any improper taste either in cream or butter: these turnips were an agreeable substitute instead of hay, which was not to be purchased; and may often be  
of

† Some assert quite the contrary.

of the same utility, if prejudice did not so often prevail.

Some also object against turnips, for feeding of sheep; alledging, that the cook need not boil turnips for the mutton, it carrying turnips enough in its flavour; at once condemning a root of general known merit for the purpose, it is so capriciously sentenced. Most people know, that in pastures there are very visible differences to be observed in all cattle, large or small, fed on such; both in respect of the grain of the meat, taste, and colour. But I believe I may affirm, that no person has attempted to say, they ever saw that distinction in meat occasioned by sheep fatted on different fields of turnips; for although turnips are more pleasing to the palate, some more than others, yet no one will presume to say such difference carry its effects so far as to alter the taste of meat, more than hogs fed on white or grey pease; or, that one sort of which may boil well, the other not boil at all. However, when we consider of the contrariety of sentiments, it is not to be wondered at; most people acquainted with life knowing, that the most salutary instructions,

Note: Horses are fed with turnips and a little hay all the winter, without any oats, in part of Hampshire.



instructions, and the most unblemished characters, are far from being free of censure.

Further. Many deprive themselves of the advantage winter turnips would give them, whose soil, as they suppose, is too strong and heavy.

In the common broad cast way, I acknowledge such land not to have a favourable prospect; shall however, attempt to remove the obstacle and put the occupier into a method of being a turnip-man, as well as his neighbours.

It is to be supposed, that in whatever way this strong wet land has been occupied it has been however, in narrow ridges, to keep it as dry as possible; we are therefore, the beginning of June, to plough it into six feet ridges. On the top, or middle of each ridge, sow a drill of turnips in a small furrow, very thin, by hand, or with a drill plough; and another at each side at one foot distance from the center row; this takes up two feet, and three rows of turnips to each ridge, leaving a space of four feet between the outer row of turnips from ridge to ridge. Two feet of the middle that has been left, throw into another small ridge, which leaveth one foot of solid earth on the outside of the three rows on the principal ridge; on the middle of this two feet ridge, sow another

D

row

row of turnips which will form the field into the following alternate ridges. Namely, A ridge of three rows; a furrow; a ridge with one row; a furrow, &c. The farmer may readily conceive in what a dry state the turnips may be in; having nothing to fear, but a pleasing prospect of enjoying a good crop.

Suppose an acre of land four perch broad and forty perches long.—Four perches being sixty-six feet makes eleven ridges at six feet each; in each of which are four rows of turnips, making forty-four rows.—Forty perch in length being six hundred and sixty feet, multiplied by forty-four, makes two thousand, nine hundred, and forty feet, or turnips at one foot distance.—Supposing them to weigh six pounds on an average, the produce will be seventy-seven tons, fifteen hundred, and eighty pounds weight; which acre will maintain, one hundred sheep nearly four months, allowing seventeen pounds to each every twenty-four hours; or, at twenty pounds weight of turnips to each sheep in twenty-four hours, an acre will keep an hundred sheep three months and three days. From this sort of land, the farmer must carry the turnips, and feed his sheep on dry pasture as before directed.

Rape,

Rape, or by some, cole, sown in that manner on such land in August, is an excellent spring vegetable, and may be fed off the land in March following, when it will produce as much in weight as the turnips, if not more; the ground may then be ploughed and sown with either of the before mentioned vegetables, fed off, or ploughed in, and then sow wheat. The plants must not be nearer than one foot in the rows\*, as rape branches out very much, often weighing in March from seven to ten pounds a plant, and at that time, three or four feet high; so that a statutable acre has often produced one hundred and four tons weight.

It is an excellent food for all sorts of cattle, which at first might be fed sparingly on it, for fear their voracious eagerness might have the same effect as clover sometimes has.

## C H A P.

\* Unless it is designed to be soon fed off, or ploughed in for manure.



## C H A P. II.



### S E C T I O N I.

#### *The* TURNIP-ROOTED CABBAGE.

**T**HIS plant, before Mr. Baker\* tried its culture in the field for cattle, was only cultivated in gardens for the use of the table; the root of which, when the outside was pared off, being boiled and served up with melted butter, &c. made a small dish, being much liked by some for its particular flavour, and having a closer texture, and less watry than turnips: but, by Mr. Baker's experiments we find it is equally as useful in the field: his account of it I shall therefore relate.

“ He sowed some turnip rooted cabbage seed the 26th of March, which was four years old, and afterwards

\* A gentleman employed by the Dublin Society to try experiments in Agriculture.

afterwards transplanted them out into rows five feet asunder, and two feet distance in the rows; and on the 17th of August, horse hoed them for the first time, by taking off, at one furrow of the plough, only one side of each ridge close to the plants: thus they remained till the 25th, when he ran the plough in the same furrow again; by which, with the first furrow, he ploughed about twenty-one inches deep. This being finished, he immediately returned the earth back to the plants; this afforded them fresh nourishment, and gave their roots liberty to penetrate into fresh earth, which by the hoeing was become very fine mold: he let them remain in that state 'till the 12th of September, when he horse-hoed them again, by taking off the other side of every ridge; and on the 20th deepened the furrow in the same manner as the former, and immediately returned the mold back to the plants; and on the 18th of October, threw up a small furrow to each side of every ridge, which finished the culture of these plants, and restored the ridges to the form in which they were when the plants were put out upon them."

He says, " The horse-hoeing was so effectually destructive to weeds, that it cost him but fourpence to weed one acre and three quarters." †

" The

† Plantation measure.

“ The repeated horse-hoeings cost him two shillings and four-pence an acre for workmen’s wages, exclusive of horses, of which he used two, and sometimes three\*, yoked before the other.”

“ That on the 17th of December he took up one row containing four hundred and ninety-eight feet long, and two hundred and forty-nine plants, which weighed eighteen hundred, and fifteen pounds, after chopping off the roots and stalks below the turnip, which ought not to be weighed, as being no part of the food for sheep or cattle : the weight of these plants, one with another, was something more than eight pounds two ounces, some few weighed fourteen and fifteen pounds. The produce upon one acre at the same proportion amounts to twenty-five tons, fifteen hundred, three quarters, and seven pounds, i. e. fifty-seven thousand, seven hundred, sixty-one pounds.”

He says, “ This crop was much greater than ever he had before ; and from some observations he had made

\* A plain indication of the strongness of the soil (which I know to be really so) yet he ploughed next the plant, at two furrows, twenty-one inches deep with a light horse-hoe plough, without fear of endangering his soil. This would appear frightful to an ignorant man, who believes every atom under his usual ploughings to be poison.



made that year, was inclined to believe their culture may be improved to a produce of ten tons more upon an acre : but, abstracted from that, the produce already obtained was more valuable than any crop he knew of, for they are invincible in the winter, either in or out of the ground. What great distress even the careful farmer is in, through the months of March, and April, for his ewes and lambs, when turnips are gone, or are but very indifferent food, and all other green winter food exhausted\*.”

“ Mr. Baker further mentions this root to be of great use to mariners going a long voyage, as they will keep, he is inclinable to believe, two months at sea, and presses much for their being tryed.”

Mr. Baker seems rather too sanguine in behalf of this vegetable. I must inform the reader, that they are a great robber of land, and by my observations on this plant in the garden, (which in fact is a field in miniature) found it to be equal with any of the largest rooting cabbages in respect to impoverishment. Mr. Baker's produce on a plantation

\* Mr. Baker seems quite unacquainted with many other vegetable substitutes for sheep, &c. in the spring, such as rape, rye, &c. already spoken of.

tation acre is but small; being only in proportion of 15 tons 18 hundred and 41 pounds to an English acre: five times less quantity than an acre ought to produce. I know, he will contend for the advantage the interspaces will make up by a following crop, on account of the summer tith. I positively deny the propriety of the mode; for had such ground been sown with a winter crop, to have been eat off by sheep in the spring, and particularly been penned on such, the land would have been equally as good for a crop of any sort of grain, and have produced five times the quantity of food. But I would wish to make myself be understood, that where I differ in opinion, it is with great deference, and the strongest conviction; not that I mean, but every person should try, and weigh with an unprejudiced application, who doubts of the thing urged. My knowledge of vegetables and earths has been a series of experimental application, upwards of forty years. And notwithstanding being confident, that few knows more of the powers of vegetable, and earthy connexions, so far as relates to the use of agriculture, yet I declare myself but an infant to what I hope yet to see, by a new mode taking place; by that noble art, becoming a rational science: at present, agriculture

culture is formed on weak implicit customs, without the least shadow of the *rationale* attending it.

## SECTION II.

### *Reynolds'* TURNIP CABBAGE.

**Z**EAL waved my pen aside, which I hope will be excused, as the cause seemed interesting; and shall take up the subject again, by mentioning another sort of the turnip rooted species, called Reynolds' Turnip Cabbage.

I am informed it was Mr. Reynolds who introduced it into England. I procured some of the seed as soon as possible, and sowed it; and must confess, that unless there is a hidden excellence which I have not been able to discover, they must rest dormant with me; they root very strong in the ground, and are intirely covered in the earth, being quite reverse to the turnip rooted cabbage, as they grow intirely above the ground: Reynolds' turnip cabbage has also a very hard, rough, thick covering, or skin; and though cattle will eat them, yet there is great labour in getting them out of the ground, which when done, are filthy, dirty roots to throw before sheep, and equal robbers of the ground with the other sort.

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Some



Some of their advocates informed me, that they were much preferable to the turnip rooted cabbage (the distinction in name, is, *rooted* left out in Reynolds' fort, and his name added) because of their manner of growth, being thereby effectually secured from the severest weather. This only served to convince me of their ignorance of the culture of the turnip rooted cabbage, as they are also impregnable against any winter our climate has known: thus, I shall dismiss that subject.

### SECTION III.

#### Of CABBAGES.

THE next winter article I shall mention, is the cabbage tribe; many of which are cultivated for this purpose in different parts of England, and Ireland; but, there are but two sorts, that ought to be noticed, viz. the large Dutch winter cabbage, and Siberian bore cole, in some places known by the name of Scotch kale.

The coarsest, moist land of the farm I should recommend these sorts to be planted in\*; it will therefore

\* If in a freer soil, turnips may be sown between the rows, and carried off on other land to feed sheep, &c.

therefore be necessary that such land should have a winter fallow; or, to succeed a crop of turnips, (*see page 17*). In August\*, sow either, or both sorts in separate beds, and transplant them out of the seed bed the end of September into other ground prepared for them to grow in, till the following spring: in dry weather in March, plough and harrow the intended field pretty level; then, at every three feet distance run a single furrow, and having dung, and boys ready, let the boys lay a double handful of dung (it being dropped about the field conveniently in heaps) at two feet distance in the furrow, another boy following with plants, which he is to drop at each little parcel of dung, a man following to fix the plant against the land side of the furrow on the dung, closing the loose earth to the plant; the plough then follows and turns the furrow back again, and a man rights the plants and settles the earth after the plough: when finished, turn a furrow up to the row of plants on each side, which will form a sort of trough, or hollow, to receive the rain; in this state let it lay till May, or June; at which time, with a small plough,

\* In a warm climate and soil I would not sow the seed 'till March, particularly the large Dutch.

plough, with one, or two horses in length, turn those two furrows back again, which will properly loosen the ground next the plants; and then turn two furrows to the plant on each side, which forms the land into small ridges, with a row of plants on each.

I should recommend also to have one row of the large Dutch cabbage, and one of Siberian bore cole, alternate through the field: the former will be gone by February, at which time the latter takes place, and will continue till May, or longer if wanted. The manner of feeding cattle with each fort is this:

If stall fed bullocks are to be fed with this species, you may put them into the stall in October; and begin with the Dutch cabbage by bringing them out of the field, slicing the quantity wanted at each time.

Mr. Baker reported to the Dublin society, that fat cattle eat about one hundred and a half of cabbages a day; (but that must depend on the size of the bullock) therefore one acre planted entirely with the Dutch fort, or two acres planted alternately, will produce of that kind, 48 tons, 12 hundred

Note. 7260 plants per acre, at 3 feet by 2 feet.



dred and 36 pounds weight per acre; at 15 pounds each cabbage, on an average, maintaining five bullocks four months: namely, November, December, January and February, at 170 pound weight a day each beast. At which time the Siberian bore cole comes in; for, as this does not cabbage, so it continues until it runs to seed, and will even then keep growing as fast as the young shoots are eat off: and though perhaps this sort may not at any one time produce an equal quantity with the Dutch cabbage, yet its successive production will fully atone. One thing must be observed relative to the manner of cutting this plant in the winter, which is, to strip off the under leaves only (if such are used) until the beginning of March, after which time, if the plant be not fed in the field, the whole top may be cut off and given for use: the stalk being subject to decay when the top is cut off, if severe frost ensue.

What relief luxuriant vegetables are to cattle in the locked up season of natural grass? How are the  
fond

Note: Parsley I know has been much used in the flinty lands of Buckinghamshire for winter use instead of turnips, which in such land they could not hoe; and also kept fed in summer, being esteemed very wholesome food.

fond bleating dams supplied with such various food, to produce streams of milk, whilst the springing meadow is sacredly protected from the trespassing hoof, to bring forth its due burthen in proper time? How well the fattening cattle may be thus supported, and the store herd nourished in the midst of famine as it were, fed on dry, insipid, juiceless straw; nay, equally supported, and more acceptable to the horned tribe, than even, in a plentiful indulgence on the golden hay of fain-foyn? If vegetable food was not an object of concern for the brutal part of the creation, such as are intended for man's lawful use and convenience, why did, or, why do the society of arts, &c. at London, take such pains, and offer such munificent rewards for discovering, and encouraging winter foods? But it must be always remembered to give bullocks, or cows, seven pounds of hay when fed on green vegetables in the winter, as it helps to correct the moisture of such food, and give the beast a better relish to it.

I cannot pass over this subject without mentioning another sort of the un-cabbaging tribe I saw at Mr. Arnold's at Wait-court Isle of Wight, who informed me, that some few years past, the seed was found in a ship, that was wrecked in that neighbourhood,

neighbourhood, but remembered not where bound to, or where from: if sown in April or May, it forms itself into large loose heads by November; sprouting out, just under the crown, many lateral sprouts of consequence; the whole, of a fine dark green colour. This summer, 1770, I described this plant to a seeds-man in London, who said he believed it to be a new sort, much in esteem among the few, and much sought after, called the Jerusalem kale; braving any severity of weather: but this is not that sort.

#### SECTION IV.

##### *Of Winter Fallowing Land.*

**T**HIS article in tillage, though simple in itself with the common farmer, is notwithstanding a material work when properly executed by the judicious husbandman, in doing which, there are various modes adapted; according to the caprice of each undiscerning man. One set of men lay their winter fallows into broad flat ridges, smooth and delicate as if the land had never gone through the operation of a plough, or intended thereby to expose any more of its parts, than just the



the surface reversed: it would be infamy in the ideas of such men, to break, and tumble the ground, and let it lay rough, having no conception that the principle of fallowing land, is to furnish it with nitrous salts from the benevolent air, and thereby replenish the exhausted land with refreshing powers; no, if he ploughs his land, and don't sow any thing in it, he has fulfilled that husbandry part as he weakly surmises.

Another set, ploughs a furrow over a part adjoining, and then backs another on the same unploughed part, which lays till the next ploughing untouched; and so on through the field, leaving also a furrow breadth unploughed between every such unmeaning ridge work; which leaves just half the land unploughed, or unfallowed; terming this work as obscure as the work itself, viz. reftering, or trenching, as in some places; nay there are three times as many terms in agriculture for each mode, as there are counties.

Another sort of men throw about one fourth of each side of the wheat ridge to each furrow, sometime in winter; and so leave half the ridge unploughed, till the whole is ploughed up in the spring for oats, or some other grain, intended to be sown with, or without clover, &c. by this means

fay

say they, we can better lay our land level in the spring: thus the absurdity of such half work husbandry, with many other acts as ridiculously erroneous\*.

Notwithstanding the multitude of these pretending cultivators of land, yet there are some judicious husbandmen interspersed, who improves in part, more than others, and whose steps carry a desire of being set in the right path: some of their tillage mode is this manner of fallowing, which they pursue: namely, to veer and ridge; this is done by turning a furrow on its neighbour land, and then returning the plough under what is just covered, which turns it, and the furrow laid on, over back again; and then turns another furrow against that furrow, and so on, turning a furrow over the whole land, and then turning the whole land back, &c. By this mode all the land is moved, and as much broke and exposed as the nature of one ploughing can do. The word *veer* is taken from a Dutch word, *laveren*, which signifies to traverse, very properly here applied, this work being traversing the whole land, and a *ridge*, as

F being

\* What a loss this is to the land, by the stubble not being ploughed in, to rot; and loss of a fallow nourishment also.

being high between the two furrows, formed by this veering, or traversing.

Beyond doubt this is the best mode of fallowing, be it for winter or summer, where land is intended to be pulverized, or cleaned of filthy weeds. If to be winter enriched, and pulverized, no way of turning it appears at present so effectual to let in the air through the undivided clods, thereby fertilizing with its nitrous atoms through the changeable weather of that season; from rain, to drying wind, to sun, to frost, alternate; impregnating with each change; and each change as often mouldering the part impregnated away, to give a new surface to be equally enriched. In winter also this form exposes slugs, red worms, and all destructive vermin which may annoy the tiller's toil.

In summer, this form exposes the yet unconquered couch, or quitch grass, whose roots will, after the laborious harrow\* has dragged out much, be there exposed to the scorching element, instead of being yet kept under nourishment in the earth, by letting the ground lay in a smooth compact body, after much labour spent to erradicate it; thus, should every land be formed, every time  
after

\* A new invented Norfolk drag harrow for couchy land.



after the harrowing work is over, until it is to be worked again. Pray, does not the land receive ten-fold advantage by this open exposure, from the air, more than having but one surface exposed, as is the common mode? I know the obstinate reptile will not be advised, therefore, he may slouch into the chimney corner, and fold his hands in his delicate bosom. This extra work is easily accomplished, with a light plough and two horses.

## SECTION V.

### *Of* LAMBS.

**L**AMBS being one of the great objects in husbandry, attention must be had to the sort of sheep which are to produce the profit, be it for the market, or the flock; if for the market, be it either for house lamb, or grass lamb, keep a kindly breed; though, perhaps your land will not admit of so large a breed as some other land may.

In some counties they kill chiefly for the market, in others they attend to breeding for stock. When the former is the object, the manager has young lambs every day in the year, by admitting the

rams

ram at certain periods, so as to answer nearly the number intended.

The rams therefore are always kept by themselves in good pasture, and at the intended time a certain number of ewes are selected into a small field, where the ram is put also, having first worried the ewes with a small dog for that purpose; this worrying warms the ewes\*, so that they seldom refuse the ram. In a few days the ram is returned again to be pampered up in his old pasture, which is always the best in the farm: an ewe goes nearly eighteen or twenty weeks.

In respect to sheep for stock, I wish the sheep breeders in England would be as attentive, and careful, in keeping each sort distinct as our rivals the French are; they strictly keep all the various sorts from intermixing in the breed; the long wool sheep are not suffered to mix with the short wool sort; or the large with the small breed. The long wool kind, which they have many years been clandestinely getting from hence, and the strictness observed by securing the breed from mixing with their short wool sheep, has at length established large flocks in that kingdom: or are the Spaniards  
less

\* An ewe is said to be in blossom when she wants the ram.

less indefatigable in procuring long wool, as well as sheep, by the same means.

Here I must digress a little, and ask, whether it would not be more for the advantage of England to allow the Irish to manufacture, and export without restriction, their wool, made into low priced cloth, not exceeding a certain staple, than to force them to sell their wool to our rivals, who cannot work up their short wool to any material advantage, against the English manufacturer, without it? I must say, it is forcing them, as England will not permit them to export if manufactured, or give them the price our rivals will. If I may be allowed to answer the consequence as it now stands, I must say, that England tacitly permits the French, and Spaniards, to work up Irish wool, and thereby injures our cloth trade abroad, instead of suffering our own subjects to receive partly that benefit, by giving them a part of the trade. It is natural for every person to sell to the best bidder: You won't buy their wool\*, or let them manufacture it, except a trifle for home consumption. Have they not an inherent right to take care of self?

If

\* Wool has been for some years from one guinea to twenty-four shillings a todd, in Ireland, much beyond the English market.



If you say, the practice of thus selling it, be illegal, I must say, such practice is forced by imprudent police in England: every act against the law is illegal, but every illegal act is not criminal in self-preservation.

## SECTION VI.

### *The Dry Lying of HORNED CATTLE.*

**A**NOTHER observation relative to winter prosperity, is the dry lying of Horned Cattle during those months.

In this particular there is a great neglect and inattention, although it really is a matter of importance, in not forming the yard properly, where the cattle are crib-fed, and lay. This should be with a rising in the middle, so that rain, and all moisture may run off from under them in their resting births; conveying it to the general place of putrefaction, where stable urine, should also be conveyed, as well as all the pig-stye moisture; it being as necessary to the well being of all cattle to lay dry, as to give them food. Is it a proper reason to say, they are used to lay on damp ground,  
and

and therefore this under moisture cannot injure them? I acknowledge, that if cattle are put into moist land to feed, there as in the yard, they must, lay, there is no alternative: but if the beast can find one spot drier than another, it will sensibly lay on it.

You will, I am sure, allow that cattle laying on wet land in winter is hurtful; not only to their thriving, but disorders in their limbs, &c. which are brought on by it also. A good husbandman always keeps his cattle on the driest land in winter to prevent the dangers mentioned; and shall he not be as attentive to his stock in the yard: dampness strikes up through the straw, be it ever so dry at top, where water lays under it: the attracting property of heat, even from the body of the beast where moisture is under, must be confessed, is, as fire, or the sun, attracts moisture to themselves, proportionably; as all heat whatever, has that attraction.

Thus also is injury done to sheep when kept on wet land; their bowels chilled, livers corrupted, with a waste of near half the wool; the farmer's toil in providing for them is lost; the rent of the land lost; and the sheep often in a worse state than when he began to feed them.

Why

Why does the judicious farmer keep his fatting calves, raised from the floor on wattled-hurdles, cleaned every day of their former wet straw, and thus refreshed? Why does the careful horseman form the floor of his stable, so as to carry off the wet from lodging under his gallant steed?

And why does the noble sportsman keep his hounds on sloping beds, but for the same purpose? each in his department striving how well each may make his care prosper. And, shall the profitable flock, and horned herd, be thus neglected?

Now I am on this subject, permit me to mention a neglect, or rather ignorance in keeping fat-tening hogs in the sty, wallowing in their own mire; this might even be excused if ignorance or neglect was the cause, but when obstinacy governs, even against conviction, there is no paliating the act.

O! says the master, they will thrive the better for it, they love to roll in dirt, and wet; they are hot, see how they grunt and moil themselves in it! infering from thence, that it is for their advantage, otherwise these brutes would not do it.

It is natural for a brute when he is hot to run into water to cool himself; but, can it be inferred from  
thence



thence that it is for his good? Wilt thou, O farmer, drink cold weak liquor, or run into water to cool thy heated body, and call it safe? Perhaps thou like the brute, may plead nature, and therefore fit to be done.

Believe, that in the brutal creation, there is a near assemblage with the rational, in disorders of the body, as well as causes from whence they proceed: let it suffice to say, that cattle are equally liable to a cholick by drinking too much cold water, when their bodies are over heated; by food disagreeing with their stomachs; affected in their limbs by lying cold, and wet; and subject to fevers proceeding from these disorders, &c. as a human creature.

Therefore, let the good husbandman form his hog-stye with the advantage of running water, just enough let in to give the hogs drink, if such he can command; let him have a covered part in which the hogs are to lay, duly attended with dry litter, and the provinder trough under the same dry covering: the open, or yard, formed with a gentle descent, that the urine may run out of the yard to their own dung, which is to be kept together just without the stye: in short, all creatures whatever, fatten and thrive better when kept

G

warm,

warm, clean, and dry, than cold, dirty, and wet: some husbandmen there are, who keep their fattening hogs as clean in the sty, as the horse in the stable.

As hogs are of such universal use, and by prudent management of the farmer, may be made more so, I shall here enlarge further than could be enforced in the compass of the *Rational Farmer*.

In respect to rearing young pigs during the months from April to October, the field culture is most pertinent. First, because pigs like vegetables more than hog-wash, that they will refuse such when used to clover or lucern. Secondly, the quantity of milk the young pigs are replenished with from their dams, together with the constant sweet food of clover, &c. these young pigs early, and eagerly eat; which makes them grow more in one week than in two, when fed in the best manner the hog-wash trough can supply. Thirdly, Every pig reared in this manner, will, after the first month, be worth double a pig of the same age, fed in the common way. Fourthly, the advantage the land receives by their rich dung, is a double improvement beyond feeding it with any other beast. Fifthly, the neat profit arising from one acre, by the sale of pigs fed thereon, is two thirds

thirds more than can be procured by any other manner whatever. To which I shall ask, Sixthly, and lastly, what does that infatuated shadow of rejection proceed from?

As to the manner of keeping pigs in such field, there are various ways adopted; some let them run at large, as I saw, between Windsor and Taplow in Buckinghamshire, in a field of 20 acres; in which were at one time 300 large pigs fatted for London fresh pork market: or, they may be penned in the field, and so confine the sows\*, letting the young run at large, from and to their sows at pleasure; or, the sows may be tyed, or tethered in the field by fastening a rope round their necks, removing them as horses are; under that circumstance; and the young, run at large. As to this, every man's judgment will direct him, according to the situation of his land. As to the profit, the farmer may easily judge that, when he is informed, an acre of good clover, or lucern in the broad-cast, will maintain twenty-four pigs and three sows, from their farrowing, six months from the beginning of April, in moderate springs: or thirty, if the sows are taken off as soon as the young have done sucking.

Or,

\* If they are found troublesome, they may be easily tamed with a proper ring.



Or, is this food of less consequence to year old pigs, or those intended for fattening the ensuing winter; their growth will be incredibly enlarged by it, after a former summer feeding in such affluence. Winter advantage I shall next speak of. First, telling the farmer, that his kitchen redundance, &c. will do as much good in a dung-hill, in summer, as in the hog-wash cistern.

Thus, after a summer's luxury (in treating of which I made a small digression) we come next to consider of a winter advantage, to keep up those prominent carcases; in doing which, I am necessarily led into a discursive tract of such roots as are best adapted for that purpose; among which are, carrots\*, parsnips, potatoes, Jerusalem artichokes, turnips, turnip-rooted cabbage, cabbages of all sorts, &c. These, every farmer may as easily obtain as a crop of any grain: First, carrots will produce as great a crop in the well tilled field, as in a lesser space of a garden; the ground harrowed fine, and the seed sowed the end of March, once or twice hoed, and set out to 8 or 9 inches distance; if the ground be very fertile, 12 inches is near enough.

\* Duhamel says, that one acre of carrots will fatten more sheep and bullocks than 3 acres of turnips.

enough. Parsnips are to be treated in the same manner as carrots.

Now, let us see what weight an acre of carrots or parsnips will produce; 17 tons, 5 hundred, and 80 pounds weight—a large quantity indeed, but not at all surprising; an acre 9 inches distance produceth 77,440 carrots, and I allow, but 8 ounces weight one with the other. A small weight this to 28 ounces, which *Monf. de Chateaufieux*, says he had on an average: they were, says he, from 18 to 25 inches long, and from  $2\frac{1}{4}$  to 4 inches diameter; he sowed 4 pounds of seed to one acre, hoed them twice, the first hoeing cost eight shillings an acre, the second four shillings. But we need not travel to Geneva for precedents, many parts of England abounding with large fields, whilst indeed other parts know not any thing of the matter. Tell many of such farmers, that there are husbandmen that sow from 20 to 30 acres yearly of carrots for their horses, cows, sheep and hogs, and they would stare at you, as if you were a monster.

## SECTION

## SECTION VII.

*Of POTATOES.*

THE next is potatoes\*, which also deserves some notice. Perhaps the farmer will find it the most useful root, when he considers it at the table, as well as in the yard; its duration in the spring, when carrots and most other winter roots are gone, and the quantity an acre of good ground will produce.

The most expeditious method is, to plant them with the plough; and, tho' the ground be tolerably good, yet a small quantity of any sort of littery dung will be of great service: to do which, the best manner is to spread the dung first all over the field, and with the plough open a furrow, men following as fast after, throwing into that furrow the dung off the breadth of the next furrow†, boys following with the potatoes which must be ready cut, by

\* The different sorts cannot be enumerated here, as almost every person give different names.

† Or turn in the dung with a skim plough, that is, a plough with one horse, that may be set so as to turn in the dung and an inch of earth or weeds if any, along with it.



by dividing them into as many parts as there are eyes in the potatoe, dropping one part on the dung in the furrow at about 8 inches distance; the plough returns, and covers them, opening another furrow for their procedure.

The plough is also the utensil to get them out of the ground in November; it is not adviseable to let them stay longer for fear of frost coming on, as a large field cannot be covered over to protect them: they are therefore ploughed out with great safety, by setting the plough into the earth a little deeper than on what they were planted; men and children following, picking them up as fast as the plough turns them out.

To preserve them through the winter there are various ways. Near London there are barns filled with them, laying straw all round next the wall, and a quantity over, to keep them from frost.

Other places they dig large holes in the ground\*, on a rising part, filling the hole with them, and roof over in a pyramidal form, first putting a quantity of long straw over the potatoes to prevent the earth from falling in among them; opening

\* As in Ireland, where there are no barns to house them in; but in either way the dirt is not taken off them, more than what naturally falls of.

ing one hole at a time, and taking out as much as may serve a week. An acre often producing 10 tons weight, at 40s. per ton.

## SECTION VIII.

### *Of JERUSALEM ARTICHOKEs.*

**J**ERUSALEM artichokes may be served just the same as the potatoes, their increase however will be much greater; an acre producing from 70, to 80 tons weight: this is a very strong food for hogs.

## SECTION IX.

### *Of TURNIPS, &c.*

**T**HE culture of turnips, turnip-rooted cabbage, and cabbages, having been already taken some notice of, shall consider them here at large, with the abovementioned roots, for the thriving pigs just taken from the clover field, now to be wintered in the yard.

And first, it may be proper to see what quantity of such provision is in the field for their use: which are, of turnips, in the common broad cast way

	Tons.	Hun.	lb.
way at 12 inches distance, and weighing 6 pounds one with the other.        -        -	116	13	64
Turnip rooted cabbage in broad cast the same        -        -        -	116	13	64
Dutch cabbage        -        -        -        -	48	12	36
Carrots        -        -        -        -	17	5	80
Parfnips        -        -        -        -	17	5	80
Potatoes        -        -        -        -	10	0	0
Jerusalem artichokes        -        -        -	70	0	0
	<hr/>		
	Tons,	396	10    100
	<hr/>		

Thus, there are 7 acres under winter roots producing 396 tons, 10 hundred, and 100 pounds weight. This quantity will maintain 100 such pigs six months, allowing 56 pounds weight to each pig every 24 hours; but if the winter hog-wash be added, 20 more may be maintained, where there is a reasonable large farm\*.

Here you see the friendly earth concealing as it were a treasure, till the gloomy season calls for relief; it then opens its tender bowels to pour forth

H

its

\* Pigs thus kept will gain in value 10s. each, at the least, during such time, if not from 12s. to 15s.



its riches, equal to summer's luxury; equal, I say, to the luxuriant lucern, or the honey-flower clover, when used judiciously.

This food should be mixed together, and boiled with hog-wash three times a day, with which they are to be fed, giving it always warm, and sweet; not hog-wash that is kept (as in the common way) souring, but perfectly sweet: untainted food will have double effect of sour, corrupted diet, how little soever the farmer may think of it.

Hogs, like other cattle will thrive most when clean, and plentifully fed; and let me tell the farmer, it is a constant full belly, nourishing diet, and warm lying in the field, or yard, that can alone shew the master what his brute families can do for him: these are reciprocal, and co-inciding steps in judicious management; either omitted, there will be a loss.

Again, in respect to providing this winter food, it will not, I flatter myself, be found difficult; when I inform the husbandman that his prolifick land, will, with winter tillage after either of his corn crops, prepare the land sufficiently for either of the roots, or feed, the ensuing spring.

The sorts for winter culture of these roots which I recommend, are: The horn-carrot; Dutch parsnip;

nip; Carolina potatoe; there is but one sort of Jerusalem artichokes; Norfolk and tankard turnip; one sort of turnip-rooted cabbage\*; large Dutch winter cabbage; Siberian bore cole.

As carrots are equally as good for horses, as for any other beast in respect to food, and preferable to common food as to preservation of their wind, I shall acquaint my reader the best way of feeding them, as far as I have known, instead of oats; though some keep horses almost through the winter with scarcely any thing else. When given instead of oats as a bait, that should be done three times a day, 8 pounds at a feed, washed clean, cut, and ground in an apple-mill; to each feed add one pint of buck-wheat meal, and two ounces of common salt; do not give the 8 pounds at once before the horse in the manger, but divide it into two or three potions, (which is the way all horses ought to be fed) with a bite or two of hay between each potion.

Salt with carrots give horses a good relish to hay, are less inclined to drink than when fed with  
oats,

\* I mention one sort of turnip-rooted cabbage, because Reynolds' turnip cabbage is often blended with it, and confounds the distinction.

oats, which in some measure accounts for the safety of their wind; nothing being more hurtful and distressing to broken winded horses, than much water.

If we examine this field of carrots we shall be able also to form the difference of expence in baiting only with them, and baiting with oats; one acre producing (as before) 38,720 pounds, or 17 tons, 5 hundred, and 80 pounds, will feed 10 horses 161 days; to which add, 30 pints of buck-wheat meal, each day, makes 75 bushels, 3 pecks, 1 quart. The whole expence of this food will appear thus.

	£.	s.	d.
Value of one acre rent under carrots	0	15	0
Ploughing ditto - - - -	0	6	0
Digging up ditto - - - -	4	0	0
Value of two acres rent under buck-wheat	1	10	0
Ploughing, cutting, and threshing of two acres of buck-wheat to be lessened so much in the oat feeding as hereafter			
4 bushels buck wheat for feed - -	0	12	0
	<hr/>		
	7	3	0
	<hr/>		

We



We are now to compute the expence of keeping, or baiting, 10 horses 161 days with oats: which may be stated in the following manner; allowing 3 quarters of a peck to each horse per day, being in one day, 30 quarterns or 7 pecks and an half, or 301 bushels, 3 pecks, in 161 days.

	£.	s.	d.
Value of 301 bushels, 3 pecks, at			
1s. 9d. per bushel - - - - -	26	8	0
Value of 9 acres rent to produce the			
above - - - - -	6	15	0
Value of 27 bushels of oats to feed			
ditto - - - - -	2	7	3
To ploughing, cutting, and threshing			
7 acres, (the other 2 acres are bal-			
lanced in 2 acres of buck-wheat)	4	13	7
	<hr/>		
	40	3	10
The sum of the carrot food			
being - - - - -	7	3	0
I shall add, one third of the			
quantity of oats produced			
on 7 acres (as in the oat			
account) taken up with			
carrots, and buck-wheat,			
viz. 3 acres - - - - -	8	16	0
	<hr/>		
	15	19	0
	<hr/>		
Ballance in favour of carrots, &c.	24	4	10
			Is

Is this an object? “ Why measter, ’tis a good zum to bezur’d, but thease things won’t do here,” says the indolent man; where I leave him enjoying himself in just as much light as to make darkness visible, as the noble poet observed.

Note. If carrots and turnips were more used for horses, what a quantity of corn would be saved for exportation, &c. A horse in England consumes from 22 quarters to 25 of oats in a year.

C H A P. III.



S E C T I O N I.

*Of* BUCKWHEAT.

**B**UCK-wheat being a valuable grain, as well as herb, it comes next to be spoken of.

As a grain, perhaps no one more useful in the farmery, either for fattening poultry, hogs, &c. or to be given in small quantities to stall-fed bullocks, and horses, when made into meal.

The green herb fed by sheep, cows, or pigs, is excellent food; or to be ploughed in when in full blossom, no vegetable manures land more; or any dung, &c. equal to it for improving, in that manner, light land.

Two bushels is a sufficient quantity to one acre for standing to ripen; but if 2 and a half, or 3 bushels are sowed in poor land to be ploughed in,  
it



it will be better. If for the former, in March or April the seed may be sown; if the latter, any time from March to July, according as circumstances may admit.

Let us now compare buck-wheat, pease, carrots, &c. as experimented by Mr. Young, in his *Essay on rearing and fattening of pigs*, and with some fattenings with pease and barley-meal that came within my knowledge in 1769 and 70.

Mr. Young, says, *Essay* 2. "In January 1766, "I drew from the herd ten hogs, as equal in size "as possible, and weighed them alive in five lots.

		Stones.		pounds.	
No. 1.	weighed	-	-	13	4
2.	-	-	-	12	6
3.	-	-	-	13	
4.	-	-	-	12	11
5.	-	-	-	13	1
14 pounds to the stone.					

" A nearer equality than this, in matters that  
" can neither be added to, nor diminished, can  
" scarcely be expected.

" No. 1. was fattened with white pease, that  
" weighed 66lb. per bushel; the price 30s. per  
" quarter.

" No.

“ No. 2. With pollard, that weighed 22 pounds  
 “ per bushel; price 9*d.* per bushel.

“ No. 3. With buck-wheat, that weighed 47  
 “ pounds per bushel; price 2*s.* 3*d.* per bushel.

“ No. 4. With boiled potatoes, that weighed  
 “ 54 pounds per bushel; price 2*s.* per bushel.

“ No. 5. With boiled carrots, that weighed  
 “ raw 55 pounds per bushel; price 1*s.* 1*d.* per  
 “ bushel.

“ I thought it best to fix on a given sum, as  
 “ proper to fat each hog. The people I consult-  
 “ ed were of opinion, that eight bushels of white  
 “ pease were necessary to fat one such hog well\*.  
 “ This I accordingly fixed on as my criterion.  
 “ The account of the expence therefore stood  
 “ thus.”

	Busshels.	£.	s.	d.
No. 1. Pease - -	16 - -	3	0	0
2. Pollard - -	80 - -	3	0	0
3. Buck-wheat - -	27 - -	3	0	9
4. Potatoes - -	28 2 <i>l.</i> 16 <i>s.</i>			
Labour and coals	0 <i>l.</i> 4 <i>s.</i>	3	0	0
5. Carrots - -	49 2 <i>l.</i> 13 <i>s.</i> 2 <i>d.</i>			
Labour and coals -	0 <i>l.</i> 6 <i>s.</i> 10 <i>d.</i>	3	0	0
I				
				“ Each

\* It will take from 10 to 12 bushels of pease to each such pig to fatten it properly.

“ Each lot was weighed as soon as the food was  
“ done: the result was as follows.

	Weighed		Fed with.	To which I remark	
	Stone.	lb.		Increased in wt.	
				st.	lb.
No. 1.	27	6	Pease.	14	2
2.	27	9	Pollard.	15	3
3.	29	13	Buck-wheat.	16	13
4.	25	7	Boiled potatoes	12	10½
5.	31	0	Ditto carrots.	17	13

“ It is evident from this experiment, that car-  
“ roots boiled are superior to any of the other food.  
“ I did not expect that potatoes would be so much  
“ inferior; but I have found, from divers other  
“ trials since, that it is requisite to mix the meal  
“ of some kind of corn with them\*. Pollard †,  
“ in this trial, as in the last, is superior to pease.”

Mr. Young further proceeds, and says, “ In  
“ January, &c. 1766, having a large number of  
“ hogs fattening, I purchased various kinds of food  
“ for them, which were given them, some alone,  
“ others mixed together, to discover which fattened  
“ them

\* For want of which is the cause of Irish bacon being soft  
and flabby.

† Some calls barley-meal and bran pollard; others the best  
bran.



“ them in the cheapest and quickest manner; this  
 “ being, in the opinion of some, a fairer way of  
 “ discovering the nature of every kind of food,  
 “ than the other method.”

Mr. Young then says, Experiment 3. “ Seventy  
 “ six hogs, from 7 to 14 stone lean, eat in 7 days,  
 “ after 9 days fattening,

Qrs.	Bushels.		£.	s.	d.
17	5	Pollard - - - -	5	17	10
1	0	Beans † - - - -	0	4	0
7	2	Pease ground - -	10	17	6
3	5	Or 2 <i>l.</i> 7 <i>s.</i> per day.			

Continuing to give an account of the quantity  
 eat each day, for 28 days, with the cost of each va-  
 rious food, he concludes the experiment (as he is  
 pleased to call it) or subject, with these conclusive  
 words, without drawing any conclusion from it,  
 viz. “ From all those trials, it appears that the  
 “ meal is better than the whole grain\*.”

I confess myself at a loss to know what is meant  
 by a chain of 15 experiments performed in 28  
 days, where not a syllable more is expressed than  
 such

† He must mean one bushel according to the sum.

\* This does not appear from the experiment.

such as this specimen, of experiment the third, just recited; therefore, have omitted the remaining part of that subject; experiments, without conclusions, being in my idea, useless, as is this republication of it: but as one part of Mr. Young's Essay, seemed not improper to be mentioned, I thought it proper to mention this last also, as it was the principal part of his famous account of rearing and fattening of pigs.

You may remember that Mr. Young observes, that carrots boiled was superior to either of the other foods, at the conclusion of Exp. 2. but by my remarks on the increase, you will find that the hogs fattened with Buck-wheat, Lot the third, increased 16 stone 13 pounds, being in weight 29 stone 13 pounds, from 13 stone when put up in the sty: and the hogs fed with boiled carrots, Lot 5, increased 17 stone 13 lb. being in weight 31 stone, from 13 stone one pound, when first put up: by which it appears 14 pounds in favour of carrots boiled. Had Mr. Young been candid in this trial he would have fed, Lot 3, with Buck-wheat meal, instead of the whole grain, as he did Lot 5, with carrots boiled; whole grain being of less effect. I say, had he given it in meal, I dare presume to declare, the favour would have fallen on  
buck-

buck-wheat. Mr. Young's first Lot, Exp. 2. was fed with 16 bushels of pease, at the charge of 3*l*. the pigs weighing when fattened, 27 stone 6 pounds. A friend of mine in 1769, fattened two hogs\* which weighed 34 score, or 48 stone 8 pounds: with

Bushels.		£. s. d.
24 Pease unground	—	3 12 0
2 Pease meal	- -	0 6 0
6 Barley meal	- - -	0 12 0
<hr/> 32		<hr/> 4 10 0

This is in favour of Mr. Young's, in respect to number of bushels and weight, if of equal fatness, as 32 bushels is to 48 stone, so is 16 bushels to 24 stone 4 pounds; viz. 3 stone 2 pounds†.

Two other friends had each a large hog, one hog was a year and three-quarters old; the other, two years and three-quarters old. They were put up both at one time, and equally fed, and of equal value, viz. 2*l*. 10*s*. each. Each eat in 150 days,

Bushels

\* Valued before they were put up at 3 pounds—Were 84 days fattening.

† Nearly 2 pounds, on every stone difference, in Mr. Young's favour.



Busshels.	£.	s.	d.
20 Pease in whole grain	3	0	0
20 Barley in meal —	2	0	0
<hr/>			
40 Busshels.			

When fattened, the year and three-quarters old hog weighed 31 score one pound and a half. The other 32 score 8 pounds and a half, or, the weight of both, 90 stone 10 pounds.

The proportion of fattening these two pigs, and Mr. Young's, is as 80 busshels is to 90 stone 10 pounds, so is 16 busshels to 18 stone 2 pounds; in favour of Mr. Young's pigs, 9 stone, 4 pounds\*. Value Mr. Young's two pigs at 1*l.* 12*s.* before they were put up, and the pease at the same price with the two latter, viz. at 3*s.* per bushel, we shall find his Lot 1, to be in value when fattened 4*l.* 2*s.* and the other two pigs in value 15*l.* The proportion will stand as 4*l.* 2*s.* is to 27 stone 6 pounds Mr. Young's pigs, so is 15*l.* the other two pigs, to 100 stone 4 pounds, which they ought to have weighed according to Mr. Young's pigs: less I say, in proportion even in this case. And if we add the value of my first friends pigs, viz. 3*l.* to the cost of fattening, we shall find another proportion in

\* The same proportion in Mr. Young's favour.

in favour of Mr. Young; namely as 7*l.* 10*s.* the value of cost, &c. of my first friends pigs is to 48 stone 8 pounds their weight, so is 4*l.* the value of cost, &c. of Mr. Young's pigs, when the pease is reduced to the same price of the others, to 26 stone 5 pounds; less in proportion by one stone one pound than Mr. Young's: so that in every case, according to Mr. Young's account, he has the advantage.

But the people in Hampshire, to whom I have talked on this subject, say, that 16 bushels of pease is not sufficient to fatten a hog of 19 score\*, which is nearly the weight of Mr. Young's pigs, Lot 1. if put up lean, as he says his were; it cost only 2*s.* 6 $\frac{1}{4}$ *d.* per score; whereas, in general, be the food pease alone, or pease and barley meal mixed, when pease are at 1*l.* 4*s.* per quarter, and barley at 16*s.* per quarter, a lean hog cannot be fattened under, from 2*s.* 10*d.* to 3*s.* 1*d.* per score: I say, such as is generally understood to be a fat hog;  
the

\* It must be remembered, that Mr. Young's pigs were small, two only making that weight. Whether small pigs fatten better in proportion than larger, I cannot say; should be inclinable to think they do, as in every way, according to Mr. Young's account, they have the advantage, if Mr. Young's were fat.

the expence varying in fattening hogs as with other beasts, some taking the food more kindly than others.

Carrots are a properer food for rearing hogs than fattening them, as before observed in winter food: It is there I recommend the farmer to lay his fort; where a good acre is worth 30*l.* 3*s.* 9*d.* at 1*s.* 9*d.* per hundred weight: like potatoes, are too soft and washy a food for fattening bacon, or pork hogs, designed either for the rack or powdering tub; for this purpose, call in the aid of buck-wheat, barley, and pease, made into meal and mixed together, never giving the whole grain.

## SECTION II.

### Of P E A S E.

**P**EASE, being much cultivated in some parts of England, I shall recommend to the farmer an observation or two. First, that pease at the common time of sowing, are an uncertain crop. Secondly, their usefulness require more than common attention. He is therefore to have his pease field



field as well prepared as for wheat, not sown on a foul piece of ground and there choaked up with weeds; this is to be obtained, notwithstanding he sows in broad-cast. And let me tell my reader, that no one but a sloven will ever have a filthy field in his care. Thirdly, late sowings are more subject to blights than early sowings: therefore sow pease in January and February; do not put off till February and March.

### SECTION III.

#### *Of BARLEY.*

**B**ARLEY is a grain of great utility in life; but like wheat the publick are deprived of one third of what the land would produce, if well tilled. How many thousand acres are sowed with barley on one ploughing after wheat? There are some people however, will blush when they read this, to think of the inattention of their brethren; such are they who plough five times after wheat for barley; and reaps 7 quarters\* instead of 3 or 4 per acre: they

K

sow

\* Seven quarters, at 52lb. weight to one bushel, are 46,592 ounces or 27,955,200 grains, at 600 grains to one ounce,

sow also in February, not later than March in any season.

But, says the slothful, unwilling man; his ground must be better than mine to have such a crop; and he must be at a great expence in keeping zoo many horses, to plough his land zoo many times. I will tell this man, that his ground, would produce as much, if masters were changed: and then his land would have five ploughings as cheap as it is now done by two only: How so? Why one man and two horses will plough as much in a day as one man, a boy, and four horses used to do on it; nay, in some land he would plough with one horse and man, as much in a day, as oft times four horses has done. Thus, this mighty secret, which, I dare say, will remain so with nine out of ten, that may read it.

By many accidental droppings of barley at harvest, it has been found they stand winter severity very well; as also, being often sown with rye in October for spring food for sheep. When accidental, and continuing with some other crop they  
so

ounce, being 232,960 plants, producing 5 tillers and 24 grains to each tiller, or ear. Each plant standing at nearly five inches one quarter distance from the other.

so chanced to be, are in ear in May, and ripe in July, something to advantage may be discovered in culture of barley, as was by the same accident discovered to great advantage by sowing black oats in October on dry lands; they being ripe the end of June or beginning of July; no spring drought retards them, and they yield plentifully: nay, white oats some winters have stood well, and surprised the farmer with its bounty next midsummer. An acquaintance of mine intends to sow an acre of barley in October next, being 1771, at the same time and field where the other part is to be wheat; this will in some measure be a further information, if not conclusive; as the same person had a large field of wheat in 1769, scattered largely over with barley, which was in ear long before the wheat, and grew very predominant until the wheat shot into ear, which soon overcame this intruder; so that nothing further could be gathered from thence.

#### SECTION IV.

##### *Of VETCHES or TARES.*

**V**ETCHES or tares, are a useful crop in a farm, particularly the winter sort: this, with rye, being sown together in October, with one ploughing,



ploughing, after any summer crop, and cut for soil in May, then ploughed up and sowed with cole, turnips, or Buck-wheat, and fed off with penning of sheep, &c. or ploughed in, is as profitable to the land, and to its master, as perhaps any part of tillage can boast of: wheat may be the succeeding crop.

This mixture of winter tares and rye, is the best food that can be given to cows soiled in the spring; it is equal to lucern in that respect for one cutting; large dairies round London are plentifully fed with it; the master of one dairy told me, that no vegetable he had known was equal to it for quantity of one cutting, or that was near equal in promoting milk\*.

Tares sowed in the spring and penned on, or ploughed in, is an excellent preparation for wheat, and one of the friendly substitutes instead of poisonous dung; and the pulse good for poultry, pigeons and hogs.

S E C-

\* It was for that reason, rye, barley, &c. was sowed for ewes and lambs in the spring as before mentioned.

## SECTION V.

## Of KNOT-GRASS.

**I**N the *Rational Farmer*, page 100, is mentioned from *England Displayed*, that near Lavington in Wiltshire, they feed hogs on a grass, called knot-grass. I shall here give a fuller description of it.

Knot-grass, Swines-grass, Blood-wort, Male Knot-grass, and by some called Bird's-tongue: in Latin, Polygonum, Sanguinaria, and Proserpinaca.

Authors make seven kinds, the sort here mentioned is the great, or common knot-grass. It has a root reddish, small, short and round, abiding all winter, and putting forth a-new every year; it comes up with many long slender branches, full of joints laying upon the ground, with many long and narrow leaves set thereupon, one for the most part at a joint; on which branches, especially from the middle upwards, come forth flowers, which are so small, that for the most part they are not seen or discerned; but in some they are white, in others of a whitish purple colour, which afterwards turns into very small square seed, like sorrel seed; where  
note,

note, that the joints have commonly a small white skin, which covers them.

This grafs is fown in fields on which hogs feed, and answers well in part of Wiltshire. It grows wild in most counties in England, as well as by the foot-ways in fields, as on the sides of high-ways, by the side of old walls, and the borders of fields; where, in some places, it even overspreads them.

“ Its use in a physical capacity is very peculiar against spitting of blood, and all fluxes of blood in any part. The liquid juice is cooling, drying, and binding, and is very effectual to stay any bleeding at mouth or nose, being drank in steeled or red-port wine; and being applied to the forehead, or temples: as also squirted up the nostrils with a syringe, cools and tempers the heat of the blood, or of the stomach, and to stop any flux of blood or humours, either of the belly, as lasks, or bloody-fluxes, fluxes of choleric, and sharp humours, &c. Dose, four spoonfuls.” Salmon’s Her. lib. I. chap. 418.

This

Note. In August 1770, I found a large piece of knot-grafs, where no cattle had been the whole summer, to which I turned some hogs and horses, the hogs, and one horse eat voraciously.



This small digression, I hope, may not be thought improper.

## SECTION VI.

### Of WHEATS.

**H**AVING made short, but I hope, satisfactory observations and directions for a new, profitable, and easier mode for treating of land than at present much known in what is termed winter and summer fallow; the latter of which I could wish to see banished from us, for our enemies companions, unless where judiciousness steps in to eradicate the filthy field of slovenliness, and thus prepare a fertile and clean path for wheat; of which I shall now speak a little, and, as a preparative, shall mention the sorts mostly sown.

First, The white egg-shell wheat. This is sown on the hazely brick-earth, and light lands, in Essex.

Secondly, The red wheat, and bearded poland, upon yellow clays in Hertfordshire \*.

Thirdly,

\* White poland, or pole-rivet, has not a hollow stalk, and therefore not so subject to lodge. Vide Hertfordshire.

Thirdly, The long coned wheat, in rank clays, in Oxfordshire \*.

Fourthly, The red lamas, on cold lands in Staffordshire †.

Fifthly, The pendulum wheat, in general in Berkshire ‡.

Sixthly, The white straw and red ear'd wheat, in the strong lands in Northamptonshire ||.

Seventhly, The red and bearded, and a sort of pollard duck bill, or as some, Fuller's wheat, in Suffex \*.

There

Note. Fine wheat requires to be heavy, smooth, and a bright yellowish colour: if dead white, they call it watery; if a deep yellow, and inclinable to a transparency, it is said to be glazed.

\* The straw, not hollow, has long awns, not subject to be hurt by birds, or mildew. Vide Oxfordshire.

† Bearded wheat. Vide Staffordshire.

‡ The ear hangs much the same as the cone-wheat. Vide Berkshire.

|| Much recommended for the plumpness of the grain, and strength of the straw, not subject to birds, or lodging. Vide Northamptonshire.

• It has such a rough ear, that the birds never injures it, the awns dropt off when full ripe, the ears large, and heavy, yields more flour than any other wheat, must be sown thin, as it tillers greatly, and has very strong stalks. Vide Suffex.

There is also another sort of red ear'd, which has a white ear and red grain, good for strong land, seldom smuts, and yields well.

Other sorts there are, such as the rough hulled, red straw, and white straw<sup>†</sup> wheat, sowed in both heavy and light soils, without much distinction, in Hampshire †.

In respect to the season for sowing wheat, places differ; not so much in difference of soil always, as custom. In some of the downs in Hampshire, Wiltshire, and Dorsetshire, often sowing when another part of the farm is reaping, August being the general time: I say, it is custom, for there are many places of the same soil as these counties, and in other parts of the same county the same soil; yet, custom alters the sowing season, not the soil.

Thus, in part of Hampshire, both dry hot land, and strong cold land, the season is rather November and December, for no other reason, than that they never sow sooner. This is the general reason ignorance gives for all its actions.

L

However,

† The first is a stout growing wheat; the second has a very red straw before it is ripe, which changes to a yellowish red; the grain is red when ripe: The other sort has a whitish straw, ear, and grain. Vide Hampshire.



However, ignorance cannot prevent my pen from informing it, that there are certain rules in nature which judiciousness always embraceth, before custom. Custom is a mere shadow of shadows, when talked of as a mode in agriculture, unless good sense speaks for it. Judiciousness, therefore, in tillage, has, for its mode and directions, experience, pure and unprejudiced, a capacity to distinguish errors, reflections in its pursuits, and judgment to embrace reason when it appears before him. To define these characters into a practical system in agriculture, the following hints perhaps may suffice.

First, It is therefore certain, nay as any axiom in Euclid, that all land, of what degree soever, is capable of being improved, and that within the reach of every man qualified to hold land.

Secondly, That all land ought to be improved, and kept to that improvement in as high a state as it can be raised to; not by ignorance, for it stops, scarcely before it has begun, and thinks the land cannot be made better; but by judicious alternative manurings, it is very capable, when marls of all kinds that cause an ebullition \* with vinegar, is applied;

\* When clay, or strong substances, do not foment and  
boil,

plied; native \* and calcinated † salts, hogs, neats, sheep, and fowls dung ‡, horns and hoofs of all kind of beasts ||, foot, sea-weed \*, and sand, &c.

My system presumes, that the judicious man has his land in the highest order (either up or low land) it is capable of. Must ask the farmer if he knows, that straw of standing corn is most prevalent, and ears less full, by sowing in December than September? He answers, he does not know. My reply is, to assure him that it is so; and if he would sow a field at those different times, he would

boil, as it were, when vinegar is applied to it in a glass, there are no vegetating salts contained in those substances worthy as manure.

\* Such are called native salts, that are in green vegetables putrefacted in the ground, or in a body together laid in a heap to rot.

† Such are called calcinated salts that are in earths, stones, bones, woods, and vegetables of all sorts, green or dry, that are burnt; to which may be added sea-salt and lime, mixed together, wet with urine, and burned.

‡ Dung of pidgeons, rooks, crows, &c. and of poultry.

|| Spread and ploughed into the ground, be the horns, &c. large or small.

\* Made into a dunghill heap, with alternate layers of earth, a year before it is used; the wetter the better when put in the heap.

would find it, where each soil is equally good, by sowing thin in September, and the common quantity in December. Should he alledge, that light dry hilly ground, such as some part of the past-mentioned counties are, wheat may be sown at an early time, but that there is no occasion to sow a strong soil so soon; he must be answered, by observing, that as light dry land is sown early, to establish it in the ground firm, before bad weather may come on to spew it out again; as also to forward it so much, that it may cover the ground in the spring before drougths come on, as is often the case; so strong wet land should be sown early, that it may ripen early the ensuing summer†: But ignorance says, the wheat will be too forward and gross in the spring, (what they generally call rank,) and that it will run to straw.

Let me tell this farmer, that wheat sown early in dry lands, enjoying the advantages above-mentioned, as well as wheat sown on cold wet lands, or in land of the finest loam, or most fertile soil, can never be too strong in the spring, provided the judicious hand scatters the grain: he is not a husbandman,

† See 9th paragraph of Remarks, p. 69, 70. Rational Farmer.



husbandman, not even a farmer, or scarcely a rational being, who does not know what each field can nearly do for him, after a few years converse with it: therefore, if he is a husbandman, he will sow quantity according to the quality of his land: If, in quality, the first, 48 pounds to one acre; if the second, 54 pounds; if in quality the third, 64 pounds; these respective quantities will be on the ground, if evenly sown from three to four inches square: and if in the spring birds and weather should have reduced it to one half, viz. that in quality the first, to 8 inches square; and that in quality the third, to 6 inches square, the ground will have its full due, room to tiller, and space for air, the very being of strength and promoter of maturity. When wheat is thick sown, it is rank indeed in good ground, and slender in poor land; one too thick and close to admit air to strengthen, and of course weak and watery; the other perished for want of substance to nourish it; so that in either case, thick sowing carries with it its doom, as well as late sowing\*.

What

\* How often do we suffer in England by late harvests; late sowing, and a cold backward spring, throws our harvest into the middle of August before it is begun, when it should be a month

What is a field of turnips for winter use, when each plant at coming up joins to each other, and so continued? What is a bed of cabbage plants in their thick state, to the distant distribution in rows? What are carrots, onions, &c. &c. &c. nay, what is timber when standing side by side? Capacity to discern, reflection and judgment to draw rational conclusions, can alone make the husbandman.

It would be endless to relate the many instances of what may be produced from a small quantity of wheat grains, not from garden culture, but in the field. Mr. Baker tells us, that in a light rye-land soil he put in six grains of wheat, each a foot asunder, which produced 29 ears, one with another, weighing, when freed from chaff, 10 ounces, and the number of grains 5710\*, which is

month sooner. I have known a great deal of wheat carted the 24th of July, old stile. The heavy rains coming on the late harvest of 1756, injured the corn so much, as to cause almost a famine the ensuing year. The family distresses are too recent to be forgot, as well as the calamitous confusion through most parts of England. And the wet sowing season in 1768, caused a great quantity of land to ly fallow all the winter, which was sown with barley the ensuing spring.

\* Thirty-one and an half grains, one with another, and twenty-eight one-fifth ears to each plant.

is only 571 grains to one ounce, they being so remarkably large. The produce was 951 times the seed sown, and 4 grains over.

In 1769, April the 11th, I planted six grains of red lamas wheat, between some rows of lucern, but the slugs harbouring there, eat all off but one, as soon as they appeared; this single plant produced 54 stalks, but did not perfect any grains \*. This was done out of mere curiosity, to see the effect of wheat sown at that time.

In the year 1770, I saw five plants of barley growing in about four inches in depth of turf-mould, taken from a barren shallow heath hill, which had been thrown out of a turf-house on a dry stoney bottom. The luxuriance of the plants was amazing, as well as the number of tillers, all of which could not be nourished: I counted the tillers in each, and the stalks in each which produced ears: The first was 38 tillers, out of which were 24 ears; the second 63 tillers, out of which were 34 ears: the third 31 tillers, out of which were 21 ears; the fourth 42 tillers, out of which were 30 ears; and the fifth 50 tillers, out of which were 32 ears. The first and second grew within

\* Mentioned to show how wheat will stock. The plant continued green the whole winter following, till May, at which time it began to dwindle, and died soon after.



within 8 inches of each other, the other three about 6 inches of each other: I counted the grains in several of the ears, and found them run, in general, from 25 to 38: These seeds were accidental, but shews, what may be produced; it tells us, that we are very ignorant of what land is capable of doing: One acre may as well produce 174,240 \* such plants, which would be 4,913,568 ears, and 154,777,390 grains, at 600 to one ounce, or 16,122 pounds 10 ounces weight; one fourth of such increase would be an amazing crop, not less than 4,030 pounds weight †. But to return to wheat.

I say, from many observations and experiments, wheat is in general sown too thick; and also as certain, that we do not receive near the produce land can give. Without going into extraordinary things, let us coolly consider of this matter, and see what advantage it is to a farmer to have his land in good order, (but not with dung, or wasteful fallow) both in respect to saving of seed, and increase of grain.

First

\* At 6 inches square.

† Seventy-seven bushels, 26 pounds weight, at 52 pounds to the bushel; I have heard of some that weighed 55 pounds to a bushel.

First then, let one acre be sown with 62 pounds of wheat, and harrowed in, this will produce 696,960 plants, at 3 inches distance; and if we allow even half to be lost before spring by birds, &c. we shall find at that time 174,240 plants, at 6 inches square.

Suppose then these 174,240 plants produce but 6 tillers, or stalks to form ears, and each ear to contain 30 grains, the quantity will be 31,363,200 grains, at 600 to 1 ounce, making 3267 pounds weight, or 51 bushels, at 64 pounds to a bushel.

Here is saved one bushel and half of seed in this acre, and an increase of 19 bushels more than the general run of what they call good ground, viz. 32 bushels per acre; being, in the whole, saving and increase, 20 bushels and half per acre.

If the wheat be ploughed in, and lightly harrowed, there will still be a greater saving of seed, viz. one peck at least, as there can be but little loss by birds in this manner, as every seed is covered. Add this peck, and you will find in one hundred acres, the loss is 51 loads 30 bushels—a quantity equal to what is now produced in general per acre, on an average.

This produce has been received from acres, it is not confined to pen, ink, and paper—land

M

has

has frequently produced it—facts are incontrovertible.

Light lands are generally more esteemed for barley than for wheat; and indeed, if sown in March, it is the most natural for that grain: but let me give a few directions, or rather advice to the judicious husbandman. When he sows wheat in such land, if he has sheep, pen them on such land before he sows his wheat, then sow on the dunging, and plough it in; having, before the wheat is sown, harrowed the penned land, that the sheep dung may be better divided, and a little blended with the earth.

Or, where the land may be something stronger, (if not clay) and the wheat harrowed in, I would advise a light penning on such harrowed wheat; for though the advantage to land is not so much by sheep-dung lying on the surface, as covered, yet the corn will receive a considerable benefit by it, as the fresh dung will, in some measure, wash in at that time of the year. Permit me here to observe the advantage wheat must have from any green vegetable \* system: Shall therefore suppose  
a crop

\* Calcinated or burnt vegetables produce a fructifying salt, but green vegetables putrefied produce both oil and salts.



a crop of any sort of corn on a field, in the year 1771. In the beginning of October, or rather middle of September, in that year, it is to be ploughed up, and sown with rye and barley, or black oats and rye : The end of February, or beginning of March, (as occasion may serve) put in ewes and lambs, there let them feed, and as many more as the land will feed of weathers : in May, plough this field up, and sow it with cole-feed : in July, feed it off by sheep penning, or plough it in ; as soon as ploughed, sow turnips or buck-wheat, and either pen-feed it off, or plough it in as before ; in either case, plough the ground, and sow it immediately again with another vegetable the end of August ; or either of the former may be fed off with hogs.

Then, in October at furthest, plough it up, and sow wheat in the manner before observed : and I dare say, every rational being will allow, that an acre under a rotation of tillage, cannot be more fully employed, or enriched.

The grains in such wheat will be very large ; the husk or chaff when the corn is ripe, opening with more freedom than when corn is poor ; and when due attention is paid to the time of cutting it, not letting the corn stand until it be ripe, as  
the

the farmers term is, that is, in fact, till it is ready to shed: No, cut it before it is ready to shed, it will fully ripen on the stubble, the grain will be better coloured, and lose less in the various movements it is afterwards necessarily to undergo \*.

Further, let us enter a little into the merit of wheat, by calling into our aid the observations and judgment of some of our wise ancients, not our late forefathers.

“ Camillo Tarello, a native of Lonato, in the  
 “ Venetian territories, in his valuable treatise  
 “ of agriculture, which he presented to the  
 “ Senate of Venice, under the title of *Ricordo d’*  
 “ *Agricoltura*, and the Senate, in justice to this  
 “ work, and the patriotic intentions of the author,  
 “ granted him, on the 29th of September 1566,  
 “ not only the sole right of vending his book,  
 “ but ordered also, that all such who adopted  
 “ his method of husbandry, should pay to him,  
 “ and his descendants, 4 marchetti (about three  
 “ half-pence of our money) for every acre of  
 “ corn-land, and 2 marchetti, for every acre of  
 “ other

\* Bind dry, and cart dry, two very material parts to be observed in good husbandry; and reap wheat when the straw is a little greenish. The floury part is more increased, and the brain of course rendered thinner,

“ other land planted according to his directions,” observes,

“ When we consider, that every ear of wheat  
 “ yields 50 grains at a medium, we may infer,  
 “ that if all these were sowed, and grew, we  
 “ should reap 50 times as much as was sown ;  
 “ but our crops are far from being so abundant :  
 “ This failure cannot proceed from any other  
 “ cause, than that all these grains do not rise and  
 “ prosper ; nor can any but one, or all, of the  
 “ seven following reasons be assigned for it, if we  
 “ except bad seasons and extraordinary accidents.

“ The deficiency arises either from, first, the  
 “ seed, or, secondly, from rain, when the corn is  
 “ in bloom ; thirdly, from winds, when its stalks  
 “ are large ; fourthly, from birds, which eat up  
 “ the grains that have been sown ; fifthly, from  
 “ worms and insects ; sixthly, from the earth ; or  
 “ seventhly, from the cultivator himself.

“ First, the cause is not in the seed, for either  
 “ the seed is good, or it is not ; if it be not good,  
 “ the grains will not rise at all, but if it be good,  
 “ as we suppose it to be, each grain may, and  
 “ should produce, at least, one ear.”

“ Secondly and thirdly, neither ought it to be  
 “ ascribed, either to rain or winds, at the time  
 “ of blossoming of the corn ; because we do not  
 “ reap



“ reap 50 for one, even when the weather is then  
 “ very fine, and even when each ear bears 50  
 “ grains, we do not reap 50 times the feed.”

“ Fourthly, nor ought we to accuse the birds  
 “ of the air ; it being well known that lupines \*,  
 “ which they never touch, do not all rise ; for if  
 “ they did, the crop would be still more confide-  
 “ rable, as each of these plants bears from 50  
 “ to 60 feeds : besides, what the birds eat is not  
 “ considerable.”

“ Fifthly, worms and insects are not the cause,  
 “ for three reasons ; first, our crops are very lit-  
 “ tle better, even when neither worms nor insects  
 “ are to be seen ; secondly, the case here is the  
 “ same with that of the lupines ; and thirdly,  
 “ the worms would ravage whole fields (as they  
 “ sometimes do) in so visible a manner, that it  
 “ would be easy to see the cause of the mischief :  
 “ however, this is an extraordinary and a pretty  
 “ rare event.

“ The same may be said of fogs, cold bad  
 “ weather, reptiles, and other mischievous crea-  
 “ tures. Though these enemies do not injure our  
 “ fields every year, we nevertheless constantly reap  
 “ less corn than they might be made to pro-  
 “ duce.

Lastly,

\* Lupines will be further mentioned in manures.

“ Lastly, the earth is not in itself the cause of  
 “ this scarcity of increase ; for the Creator has en-  
 “ dowed it with perpetual youth and fruitfulness ;  
 “ as Columella \* justly observes in the first chap-  
 “ ters of his first and second books, that the earth  
 “ and nature are always the same.

“ Now, if the usual cause, why we do not reap  
 “ 50 for one, cannot be imputed to either of the  
 “ things above-mentioned, it must necessarily be  
 “ sought for in the ignorance, negligence, and in-  
 “ dolence of the husbandman : for, our practice is  
 “ diametrically contrary to that of the ancient Ro-  
 “ mans : they ploughed often, and sowed little ;  
 “ yet every family lived upon the produce of his  
 “ own farm ; but we plough little, and sow a  
 “ great deal, and are always disappointed.”

This leads me further to discourse on plough-  
 ing, and vegetable manures, to fit land more apt-  
 ly to produce, what it will never fail to do, name-  
 ly, abundance.

\* Columella wrote twelve books on agriculture, and lived  
 in the time of Claudius ; he was a native of Spain. He says, in  
 Spain, where sheep feed on clay soils, as well as light soils, or  
 long on one pasture, they give salt to the sheep on stones in  
 the field.

C H A P.

## C H A P. IV.



## S E C T I O N I.

*Of PLOUGHING.*

**P**LOUGHING, says M. de Chateaufieux, is the thoroughly dividing and loosening the soil ; it is so generally received, that there is not a farmer who does not know, that one ploughing more than ordinary, is of as much service to his ground as dunging it would be: were its full value known it would be more practised, and every husbandman would give all his lands, at least, one ploughing extraordinary."

" To satisfy myself, says this great man of Geneva, what may be done with the plough alone, I resolved on a spot of ground, which I knew to be incapable of naturally producing any thing, to  
make



make the trial on. Some years before, I had dug away all the earth, three feet deep, from a space of 60 square perches. Nothing had remained in it but a white clay, like that which potters use."

"The ground was laid out into beds, which were afterwards sowed with wheat, and the spaces between were frequently stirred. The first year my plants were poor, and branched only into two, three, or four stalks; the second year much better; the third year they were as large and fine as any garden could have produced. This spot still continues to produce equally well, the soil is now like fine mould; and, which is very remarkable, it has lost its first white colour, and is become black. Let us but do the same with any of our bad lands\*, and persevere in stirring them a sufficient time, the success will not be doubtful."

Thus the illustrious Monsieur Lullin de Chateavieux, the great magistrate of the republick of Geneva, saw, that the poor white impoverished clay was capable, by exposing it to the air, to produce

N

corn;

\* How diametrical is this to the perverseness of men, who are startled as at a ghost, if they see any earth turned up in ploughing more than the common staple, or gange, as they term it.

corn; he also saw that stubble was a great manurer of land when ploughed in; although I know it is a custom in some part of Kent to drag it off the land and carry it away; ignorantly supposing, as it was not rotted to dung, it would not rot to do any good in the ground.

M. de Chateauvieux's words are these: "Stubble lays ready on the spot, the ploughing of the earth covers it, and it is a long time in rotting, it keeps the soil loose and light. I have found stubble almost at a whole year's end, and have seen some not quite consumed at the end of two years. From what I have seen of its effects, I will venture to say, that it contributes greatly to increase the production of the earth. I have often plucked up plants remarkable for their beauty, and frequently found their roots interwoven with tufts of stubble, which shewed me the cause of their extraordinary growth."

Notwithstanding this ingenious advocate for the drill husbandry, thereby to avoid dung, and which system of tillage is perpetual without it, or any other assistance to the earth, except air and stubble, saw, and acknowledges the advantage of even the dried shadow of vegetable manure, even the dried straw of the field. How much more useful  
then

then must be the vegetable ploughed in to the earth to rot in its full vigour\*, where every particle of nourishment is diffused through the earth; not the least part of its saline juice evaporated, or exhaled.

But he and M. Bilberg, (whom I shall have occasion by and by to mention further) was still darkened, and could not see the profuse spring of nature, although at the brink of it.

This vegetable system is the medium between the partizans in agriculture: between the common mode of dung-hill, and wasteful fallows, on one side; and the Tullian† drill husbandry on the other. One pursues the dung-hill and fallow; the other, air and fallow. The vegetable medium between both, is always enriching, always profitable.

Alas, the drill or Tullian husbandry, whatever some nick-nack people may think, or amuse themselves with, can never, or at least I hope, will never more prevail, as it cannot answer the cultivators

\* To cut all sorts of weeds in blossom, laying them to rot in layers of earth, will, when rotted, cut like butter, being full of oil.

† Mr. Tull who wrote on drill husbandry.



tivators end, either in manner or profit by tenfold, Husbandry consists of other ingredients than fancy, or weak chimæras; it is a field equal to the horizon; not confined to drill toys, and ideas of supernatural productions: but it is a strong and permanent knowledge of nature in a scientific understanding, whereby the ever-flowing earth is throwing out its abundance, expence lessened, and the land daily augmented; not with airy\* particles only but with the pure, the rich, the oily and untainted substance of nature.

It was this led the ingenious M. J. J. Bilberg, in his *Oeconomy of Nature*, to say: “ Plants as  
 “ well as living creatures, must submit to death.  
 “ They spring up, they grow, they flourish, they  
 “ ripen their fruit, they wither, and at last, having  
 “ finished their course, they die, and return again  
 “ to the dust, from whence they first took their  
 “ rise. Thus the black mould which we  
 “ see upon the surface of the earth, is chiefly  
 “ owing to dead vegetables. For all roots descend  
 “ into the earth by their branches, and after a  
 “ plant has lost its stem, the root remains; but  
 “ this

\* Airy, such only is the nourishment the earth can receive by the drill and bed husbandry, except stubble.

“ this too rots at last, and changes into mould.  
 “ By this means, this kind of mould is mixed  
 “ with the earth, by the contrivance of nature;  
 “ nearly in the same way as dung thrown upon  
 “ field is wrought into the earth by the industry  
 “ of the husbandman.”

“ The earth thus prepared offers again to plants  
 “ from its bosom, what it had received from them.  
 “ For when seeds are committed to the earth, they  
 “ draw to themselves an accomodate, suited to  
 “ their nature; and turn into plants the more sub-  
 “ tile part of this mould, by the co-operation of  
 “ the air, sun, and moisture; so that the tallest  
 “ tree is, properly speaking, nothing but mould  
 “ wonderfully compounded and modified by a  
 “ virtue communicated to a small seed by the  
 “ Creator. From these plants when they die,  
 “ just the same mould is formed as gave birth  
 “ to them originally; but in such a manner, that  
 “ it is in greater quantity than before, if the earth  
 “ be kept loose to admit of the free extension of  
 “ their roots. Vegetables therefore increase the  
 “ black mould, whence fertility remains conti-  
 “ nually uninterrupted: whereas the earth would  
 “ not make good its annual consumption, if it  
 “ were not constantly recruited by new supplies.”

Thus

Thus much the ingenious Bilberg, whose idea of vegetables, as being the support of nature, that they are earth itself, &c. is well expressed: but he, like many other great men in various arts and sciences, had a glimmering only of what others from thence may improve. He saw a small stream, not thinking there may be greater from the same spring.

He saw vegetables produced, decayed, and so returned again when time had impaired them, and enriched the ground, as well as added to its substance; I say, added a substance†, more than it received.

Hence, if exhausted nature is so useful to its parent when it returns, how much more must its nourishment be, when returned in fullness of vigour: and when this succulent production is ploughed into the earth, in its strength of oily  
aliment,

† Van Helmont dried 200 pounds of earth, and planted therein a willow, which weighed 5 pounds; he watered it only with rain, or distilled water; and, to secure it from any other earth, covered it with a perforated tin cover: at five years end weighing the tree, with all the leaves it had borne in that time, he found it to weigh 169 pounds 3 ounces; yet the earth was only diminished 2 ounces: being a proportion of 164 pounds 3 ounces increase of substance to 2 ounces diminution of earth.



aliment, there concocted in its mother's bowels, adds as it were prolificness to prolific nature.

Further, the custom of ploughing in green vegetables is very ancient, all the Roman authors speak of it particularly.

Mago, a Carthaginian general, was so fond of agriculture, that he wrote twenty-eight books on that subject, which Columella observes, were translated into Latin by an express decree of the Roman senate. Servius adds, that Virgil being so fond of this vegetable system, that he used these books as a model when he wrote his *Georgics*. And it is thus far certain, that Virgil was so fond of succulent manures, that he even mentions oil of olives, and lees of oil as a manure.

Among the moderns, the Flemings, in 1600, were the first who ploughed in living crops for the sake of fertilizing the earth, and confined their sheep in sheds built on purpose, whose floors were covered with earth, &c. when they did not penn in the field.

The vegetables they used for cattle were Lucern, Sain-foyn, Trefoil, Sweet-fenugreek, Buck-wheat or Cow-wheat, Field Turnips, and Spurry.

Duhamel,

Note. Columella calls this Mago, Rusticationis Parentem.

Duhamel, observes page 25. " 'Tis as great  
 " a folly to dung grounds which require cooling,  
 " as it would be thought to administer poison to  
 " cure a man of a fever. Our farmers are not  
 " sensible, that the temper of the land must as  
 " necessarily be consulted, as the pulse of the pa-  
 " tient. The dung-hill only is their universal re-  
 " fuge; they fly to that on all occasions. They  
 " miss a crop by dunging an improper soil, and  
 " lay on more dung to remedy this misfortune "

Again. *New System of Agriculture*, page 114.  
 " It is to me" says he, " a surprizing proof of our  
 " gentlemen's inaptitude to this noble art (argri-  
 " culture) to see so many hundred thousand acres  
 " pestered and corrupted by common dung, the  
 " bowels of which land are loaded with inexhau-  
 " stible quantities of rich wholesome physic for  
 " its own diseases. Dung is not only prejudicial  
 " to some soils, but inferior to the worst of other  
 " composts upon any."

Pliny's account of marl in Britain by the Ro-  
 mans, chap. 6, is such, that whoever will be at  
 the pains to read what he says on that head, will  
 have

Note. Pliny and Columella recommends a mixture of  
 water and urine, or a decoction of Cypress leaves, for land.

have sufficient reason to think, that we are still far below the point to which the Romans had then brought it in this island: it keeps hot land cold, and warms in a short time cold land, and fills up all the vacuities in sandy soil.

Among other succulent manures, Columella mentions lupines as an excellent one for land. This is a sort of wild pea, cultivated principally for poor, hungry, worn out ground, especially if dry and sandy; sown in February or March it will blossom three times between May and August, and prove an excellent enricher of the ground when ploughed in just after the second blooming. Their seeds par-boiled, and sown about 16 bushels per acre, is also, a great improver of such land. The par-boiled lupines are used in some parts of Italy, by laying them to the roots of vines."

This may not seem more strange than even a recent practice, to some of our old fashioned leaven; that is, for the worn out marl lands in Norfolk, they obtain oil cakes from Holland, and scatter them when broke on their land, at a charge of about 15s. or 16s. per acre.

The Flemings, and Hollanders, cultivate spurry, of which there are two sorts used by them. It is an annual about six inches high, flowers in June,

O

and



and feed ripe in August. Their accounts is, that it is an excellent winter food for cattle : it enriches the milk of cows so as to make it afford a much larger quantity of butter; and the mutton fed with it is preferable to that fed on turnips. Hens also eat this plant greedily, and it is commonly thought to make them lay an extraordinary number of eggs. They sow it on their poorest sandy ground, and by feeding it, the cattle improves the land more than by eating any other vegetable.

The farmers in the low countries commonly sow it twice a year; the first time in April or May to be in flower in June; and the second time after their rye-harvest to serve the cattle in November and December. The usual allowance is 12 pounds per acre.

## SECTION II.

### *Of the FRENCH HONYSUCKLE.*

**F**RENCH Honysuckle is used for summer grazing in part of Flanders, being a prodigious grower, very succulent and nourishing, producing a large quantity of food, but too stalky and

grofs for hay; and is an abiding plant. I have seen some horfes refuse it at first, though others are very greedy after it; 'tis certainly a very profitable food. Two bushels will sow an acre although the seed is large; one foot distance is sufficient for the plants as they stock out every spring much. It is often sown in gardens for the colour of the red spiky like flowers.

This plant must be sown alone in March, and may be fed in July and August, and from May the ensuing year, or ploughed in for manure in June, rolling it once over before the plough, and ploughing it the same way with the lay from the roller. The stalks being grofs and succulent, the ground should not be stirred again for three months, and if a light soil, it will not require to be ploughed till the wheat sowing season.

## C H A P.

C H A P. V.



S E C T I O N I.

*Of the Change of GREEN VEGETABLES into MANURE.*

HAVING in some measure been called on further to explain myself relative to green vegetables as manure, since the *Rational Farmer* made its appearance, I shall here endeavour, after a few observations, to give the analysis of the change of green vegetables into the state of putrefacted manure, and its powers.

First then I shall observe, that it is the custom or practice of some few to plough in green vegetables for manure, instead of dung-hill stuff: which may be called vegetables in an intire state. The sorts sown for that purpose are turnips, buckwheat, cole, tares, and pease. I call them vegetables



tables in an intire state, to distinguish them from dung, made of dried, exhausted straw &c.

Some object, that as vegetables receive their food from the soil on which they grow, it is natural to think, that when ploughed down, they do no more than restore what they had taken ; therefore, land cannot be rendered more fertile thereby ; that land frequently ploughed, none of its vegetable food is exhausted.

This objection is at once set aside by the known practice of ploughing in clover, for a crop of wheat ; nay, after it has been twice mowed, that land produceth a better crop of wheat than a fallow would produce\*. Even the covering of the surface with the long stalks seem to be an advantage ; for thereby the air in the soil, not having free communication with the external air, becomes putrefied, by which a fermentation is raised, and vegetable food enlarged. Whatever may be the cause of this fermentation, the fact is obvious. Every farmer knows, that when the soil has been covered for a considerable time by a strong crop of pease, or any other kind of corn laid down, (commonly called flooming) and though hard and stiff, be-  
comes

\* Occasioned by the roots rotting.

comes mellow, soft, and free, and obviously in a state of fermentation†. Probably this is occasioned by the corruption of the air, or of the water, which the covering of the surface prevents from being exhaled.

To these things may be added, that it is not impossible but the plants when growing may suck in the vegetable food from the air in as great plenty as the soil would have done, though there had been no plants growing in it, says a celebrated writer.

Further, if plants have this faculty, considering what an immense surface is exposed by them to the influence of the air, the quantity‡ of vegetable food acquired cannot be inconsiderable.

That plants have this faculty there is no doubt, being formed with innumerable organs of transpiration; the greatest part of useless sap goes off

† I knew a man who broke up a strong lay in November, in as broad furrows as the plough would carry, that there may be the fewer divisions for the grass to grow between; and in March following dragged it and sowed pease, of which there were a great crop. When the ground was ploughed up, it was so mellow, and rotted, that he sowed a crop of wheat on it.

‡ Quantity, see note page 94.

off that way, through the leaves\* in particular, they being the vehicle of internal superfluities as well as to imbibe fresh air, and acts as lungs to the plant. The remaining part of the sap, being the purest, is reserved in the plant for its innutrition.

This leads me to a short analysis of the change of green vegetables by fermentation and putrefaction, into their original nature; carrying with their returning substance a manure to enrich what had given life to them; and so paying, as it were, double interest to the earth from whence they came.

Throw together any of the tender, green and succulent vegetables, whether acid or alkaline, in a heap, and press them together, the middle part will in a little time spontaneously conceive a small degree of heat, and successively pass through the other degrees, till it arrives to a state of ebullition, and be perfectly putrefied.

In the space of the first three days, they will yield a heat equal to that of a human body; by the fifth it will be painful to the hand, and lastly, from that time to the 8th or 9th day, the juices will appear

\* Leaves of all herbs, trees, &c. is by which all the external nourishment is received: if a tree be deprived of its leaves, it no longer continues in a productive state, and if so continued, the tree will die.



appear ready to boil, and sometimes the matter will even flame and burn †

By this spontaneous operation, the vegetable acquires an abominable putrid, stercoraceous or cadaverous taste and odour, and turns entirely into one soft, similar, pappy mass, or crassamentum, greatly resembling fetid human excrement in the scent, and putrefied flesh in the taste.

Says an excellent Chymist, “ If this fetid matter be directly committed to a glass retort, and distilled, there will come over, first a water impregnated with a urinous spirit, perfectly like that obtainable from animal subjects, and separable by a fresh distillation, into elementary water, with pure white volatile, dry alkaline salts, not to be distinguished from animal salts: second, a volatile, alkaline oily salt: thirdly, an exceedingly volatile and a thick fetid oil, both which are intirely like animal’s.”

“ This process is truly universal in all vegetables whatever, in the coldest and most succulent watery plants, such as purslain, sorrel, &c. as well as the hottest acrimonious; but the sooner (and of course so much stronger) as the vegetable

† Witness the many hay-ricks burnt from the same cause.

“ table contained the greater quantity of oil : but  
 “ the phænomena the same.”

It is surprizing to consider, that by this means the difference between vegetables may be entirely taken away, and the whole kingdom (as observed by a noble author) thereof reduced to one common nature ; so that worm-wood and tansey, sorrel and scurvy-grass, shall appear as one and the same thing, and this thing appear no otherwise than putrefied flesh.

Though sorrel be famed for its preserving the animal fluids uncorrupted whilst they are circulating in the body, and scordium for its embalming virtue as continuing it in a state of incorruption after death ; yet, even these plants are of themselves thus easily and simply corrupted and changed into such a kind of putrefied flesh, as it is their virtue to prevent.

This Boerhaave considers as a general law of nature, wisely established to produce wonderful changes in the world, and prevent the inaction and decrease of matter \* in our globe : this active prin-

P

ciple

\* The drill husbandry must waste a great deal of this matter, as it is always carrying off substances, but never returning any, the nourishment of the ground proceeding from air only, except dry stubble, as before observed.

ciple and medium, giving an easy and reciprocal transition of vegetable into animal substances, and animal into vegetable.

Hence we are given to understand the nature and use of putrefaction, with its difference from fermentation in regard to the subject, cause and effect: vegetables alone being the subject of fermentation, but both vegetables and animals of putrefaction.

We see also that vegetable putrefaction is begun, and promoted by fermentation or heat, and finished by concoction, which requires a degree of heat much greater than that excited by fermentation, as being capable of causing an ebullition in the plant, and even of turning it into flame: as indeed, the immediate cause of fermentation is the motion of the air intercepted between the fluid, and vicious parts of the fermenting liquor; but the cause of putrefaction is fire itself, collected or included within the putrifying subject.

The effects of fermentation are the production of flowers or yeast, the conversion of the saline part of the fermenting body into tartar, or an acrimonious acid and fixed salt; and of oils, into an inflammable spirit retaining something of the nature of the vegetable; but putrefaction makes all the  
acid



acid salts volatile and alkaline, renders the oils not spiritous but abominably fetid; utterly destroys what makes the specific difference between one subject and another, and converts them wholly into a soft pulpy mass of an animal nature, without the least signs of any fixt salt, though the recent vegetable would by calcination at the first have offered a large proportion: putrefaction, in fine, makes nearly the same kind of alteration in the whole subject, as it would undergo by passing through a sound animal body, suffering all the actions thereof, and being at length turned into the form of excrement.

This operation lets us a little into the nature of animal digestion, or the change which the aliment suffers in the human body. For, the change our vegetable foods undergo in the body being such, as bring them to be of the same nature, and afford the same principles with the changes induced by putrefaction, is a presumption that digestion is nothing else, at least it apparently comes nearer thereto than to fermentation.

The great chymist Glauber \*, who studied more into, and acquainted himself with the virtues of  
nitre

\* Glauber a German chymist, made the Glauber salts so called, and opened to the world the value of nitre.

nitre and the vegetable world, than any one before or since his publication of that labourious *System of Chymistry*, says, “ that putrefied vegetables has the same virtue as vegetables putrefied in a beast’s stomach, which is done in twenty-four hours.”

And another excellent chymist, when speaking on the native principles of vegetables, says, “ the native substances naturally contained in vegetables are gum, resin, a subtle oil, camphor, a gross oil, a saline matter, phlegm or water, intimately blended with these, and which serves as a vehicle to dilute and fit them for circulation; lastly an earthy matter which is the substance or basis of all vegetables, the principle on which their firmness and solidity depends.”

Fermentation is sooner or later brought on according to the degree of oily matter in the vegetable; and the putrefacted substance produced from thence, is more or less powerful according to the quantity of oily juice such vegetables may be more or less replete with; and such putrefacted vegetables are entirely the same as to nature and property, be they putrefied in earth or any digestive body; with this material distinction of power, according to the natural heat of the digesting body it is thus putrefied in. For instance, pease eat by  
pidgeons,

pidgeons, rooks, &c. the dung of such is more powerful than the dung of pigs, horses, or bullocks fed with the same food. So that to obtain the powerfulest animal putrefacted substance, must be from the most oily sorts putrefied in the hottest natured animal.

From the whole may be gathered. First, Fermentation is the same be it in earth, or in the body of a beast. Second, Putrefaction is the consequence of fermentation carried on to a stercorated state. Lastly, Putrefacted vegetables are similar, be the coction performed in earth, air, or animal; but lessened or deprived of the best of its nutritious juice by adding to, and supporting the creature it passes through\*. Therefore, as the loss of the oil in the putrefacted plant, is to the nourished beast, so is that putrefacted plant or stercoraceous substance less by such nourishment. And of course, the native plant loses by that process, so much of its purest juice, as went to the nourishment of the beast.

S E C-

\* Except pidgeons, rooks, &c.



## SECTION II.

*Of the Nourishment of Plants.*

I Shall next enter into a subject much disputed, Namely, whether plants have each a peculiar food in the earth, or whether it is one food, that supplies each variety.

The advocates for the variety of food, say, "It is well known that when land has been wearied with one sort of plant, the earth is exhausted of all the food natural for that sort of plant's nourishment; it has however, produced the next year a good crop of other plants, whose food differed from the foregoing. Such is given as a cause why barley succeeds wheat, and perhaps oats, or pease, barley; as each has their particular food, they can succeed each other."

Those of the contrary opinion, say, "If each plant drew from the earth only the particular juice proper to itself, poppies, thistles, &c. which kill wheat, would do it no hurt. Wheat might in that case, grow as well in a common, as in a well ploughed field. Let it not be alledged, that the stalks of weeds are what hurt the wheat, and not the  
the

the roots by the juices they consume; for if dry branches were to be set in such numbers as to make a greater shade than those weeds, they would not, equally prejudice the wheat."

Mr. Duhamel, page 8, observes, first, " That many plants of different species feed on nearly the same substance.

" Secondly, there is no plant that does not rob those that are within its reach of some part of their food.

" Thirdly, that the soil which is good for one kind of plant, will always be able to supply it with food, provided it be cultivated properly."

" If these propositions are true, it follows that there is no necessity to change the species of plants from one year to another, on account of the different nourishment which the earth is supposed to yield them."

He allows, that in the common husbandry there is an advantage in sowing different plants successively in the same land. But this may be owing to the causes, very different from those to which we have opposed several objections.

" First, the quantity of food which is necessary to some plants.

Secondly,

Secondly, The particular constitution of each plant; some being more tender than others.

Thirdly, the degree of tillage, each plant requires."

"All plants do not draw a like quantity of nourishment from the earth. A proof of this is, that there are poor light grounds which produce rye, millet, and buck-wheat; but cannot produce wheat, or even oats\*."

"If therefore you would always sow wheat in the same land, it must be sowed only every second year, and left fallow each intermediate year, in order to give it the necessary ploughings. By this means I believe it would always produce good crops."

"Let us conclude then, says he, that it is possible to have a good crop of wheat every year off the same land. All that is required to that end is, to plough oftener, to divide the particles of the earth sufficiently, to put the plants in condition to seek their necessary food, to hinder weeds from robbing the plants cultivated, and lastly to raise

no

\* It is obvious that whatever tree, or plant, grows most luxuriant in a poor soil, requires less food than others to nourish it.



no more plants in a field, than it can nourish properly." Thus much Duhamel.

I must confess, that my sentiments intirely co-operate with those who contend that there is but one sort of food for all trees, plants, &c. &c. the earth being always ready when rendered fertile by air or other manures to send forth one vegetable as well as another, but in various states of strength according to the quantity there may be in the earth of food; one plant requiring more to carry on a process to perfect it than another.

Not one person yet has said, that among the thousands of seeds of various plants that has been committed to the benevolent matrix of vegetation, if they were capable of vegetating, warmth, and a proper season for their respective qualities, and nature, but that in the same soil, each has grown or vegetated. And if seeds vegetate when put into the earth, it is certain the food is suitable to such plant.

For if many sorts of seed suitable to any particular climate were put into a square of earth, of only one foot, as there are spaces to receive them, laying joined together, every one of those seeds will, if there be life in the seed, the texture of the

Q

earth,

earth, and warmth communicated answerable to such clime, grow.

Each square inch is capable of receiving 100 feeds; and there being 144 square inches in one foot square, the number contained would be 14,400 to receive as many different foods, if the food were not the same to all: Can any man suppose that in such space there are as many foods contained, as separately to vegetate each feed? Or that every particle of air (a particle ten thousand times smaller than the smallest atom†,) contains the various foods for all the various vegetables, plants, &c. upon earth.

That air has the same fructifying quality in all climes, both in and out of the earth, is evident by succulent plants growing in the open air without any other nourishment, in the latitude of 50 north, that are natives under the line; as well as such plants growing in earth, in such latitude; so that earth and air are the same in every clime, though of different texture and fluidity, each nourishing  
according

† Air being composed of so many minute particles, as to form a fluid capable of being compressed, or diffused, into more than a million of times the space it possessed. And its investiture of the earth equal to 2160 pounds weight of every square foot, or 15 pounds on every inch square.

according to the quantity of neutral salts therein contained.

If each plant has its peculiar food in the earth, each plant must have an attracting power to draw from each fluid atom the nourishment only, similar to what it is receiving from the earth, otherwise the external nourishment imbibed by the leaves, would counter-act the internal, and so confuse the whole system of vegetating nature. The leaves of plants and herbs, &c. are to them, as the lungs are to man, continually imbibing and transpiring; if that stops, a dissolution immediately follows; therefore, the food in the earth and air must be similar.

Neither can it be rationally supposed, that all the various beauties of the flowery world, whose tints are so innumerable and so exquisitely shaded, are formed from various foods in the earth, distinctly conveyed from thence through particular organs in the plant. No, there is something more in the wonderful works of the Creator, than to beautify those inimitable productions of nature by methodical rules from the earth. It is in the inconceiveable system of hidden operation, after the juices enter the root.

Much



Much more may be said, but let this suffice to confirm my opinion, by mentioning what is recently known to almost every one ; namely, that apple trees grafted on a crab, do not receive the same juice as first received by the crab stock from the earth, but is transmixed as it enters the cyon into the nature of the various fruits so grafted.

Thus each species of fruit grafted on a crab-stock do not receive various juices from the earth that causeth such distinctions in colour, taste, and times of ripening, no more than does twenty sorts grafted on a former grafting. The same juice which supports the stock from the earth, supports the whole variety of sorts on that stock, changing the juices not from the earth but at the entrance into each at each cyon; each sort having different organs and different modes, which changes crude and undigested juices into a more pure liquid, fitly adopted to nourish the branch, the leaf, and the fruit peculiar to itself: but originally the same in all.

Since then one food nourishing the crab, and the nonpariel on that crab, why may it be supposed, that one food cannot nourish different grains.

Ask

Ask why barley succeeds wheat, and not wheat after wheat, you are told that wheat had drawn out of the earth most of the juices peculiar to wheat, but that the juice or food which nourishes barley is left; and so on for the same reason some other grain is sowed after barley, and not barley again, whose different sorts receive different food.

These being reasons of ignorance, shall inform my reader why those general common rules in farming are practised, and oppose to each the foundation or concealed ground work.

*The Farmer's Reasons.*

Land being in good tilth it produceth a good crop of wheat.

*This is granted.*

Wheat not being sown immediately after wheat, is, because there is little or no wheat nourishment left.

*Granted : great part of the former year's nourishment is exhausted.*

Barley is sown after wheat, because there is barley food though not wheat food.

*By experience it is found that barley succeeds wheat best. But the reason is, barley requires less nourishment than wheat ; there may be food enough for one though not for the other.*

Oats

Oats succeed barley better than barley oats, therefore barley is first sown.

*By experience as above ; but the cause is, oats do not require so much nourishment as barley, therefore fittest to follow.*

Pease are sometimes sown after wheat, and a good crop of barley succeeds a crop of pease, tho' not after oats, and often wheat succeeds pease.

*Pease being a very little impoverisher of ground, nourishes it more by its over-shadowing than it exhausteth of nourishment ; nay, good crops of wheat are often after pease.*

Thus when the respective sorts of grain, having drawn out of the ground their peculiar nourishment, dunging and fallowing comes next to replenish the earth a-new, with food for another rotation of crops, the first wheat.

*By this rotation of exhausters, according to their lessening quality, the ground is at length deprived of its neutral salts, and cannot give further aid until the earth is again replenished with a source for future labours. The salts in the dung, and nitrous particles in the air, joining with the acids of the earth, causes a new fermentation, or ebullition of its bowels, and so replenishes it again with new food.*

As



As the juice or food of plants in the parent earth, being the same to all, so air to man is the same air to beasts, and external part of vegetables, breathing and imbibing the same air.

And as the same juice, internally nourishes, so the same air externally feeds the sweetest rose, or striped carnation; the stinging nettle, or prickly thistle; the golden pippen, and sour crab.

Hence I conclude, that there is but one natural food in the earth or air, for all sorts of trees or plants; one requiring a greater quantity than another, but variously digested through the organical frame of each species of nature.

### SECTION III.

#### *Of the VEGETABLE SYSTEM compared with DRILL-HUSBANDRY.*

FROM what has been observed, it follows next to enter into a short discussion of the merit of my vegetable system, comparatively with the drill-husbandry.

To set both in their proper view, each shall be distinctly stated with candour and precision; in doing which, I shall begin with wheat. The green vegetable

vegetable system, with land highly improved with such ; and the drill system with fresh land, prepared for the drill.

To one acre in the vegetable system to	lb.
sow in broad-cast	62
And reap nearly 53 fold	3267
	<hr/>
Neat pounds weight on an acre	3205
	<hr/>

To one acre in the drill system, (as all the accounts in quantity sowed differ) I shall state it at the same weight with my system, viz.	lb.
	62

We are told by a modern writer, Mr. Young, that in Yorkshire they sow in the drill-husbandry 80 lb. or one bushel, one peck. Reaps 16 bushels. In Cumberland, they reap 15 bushels in the drill-husbandry.

M. Duhamel tells us of 19 bushels, 22 pounds weight to one acre : And another account of 27 bushels 6 pounds reaped from one acre. So that on the whole I will rest it at 22 bushels, or

Remains, neat pounds weight on one acre	1408
	<hr/>
	1346
	<hr/>
	I shall

I shall now state the course of tillage and profit for 10 years, according to the broad-cast vegetable culture, and compare that with 10 years successive culture of drill-husbandry, producing wheat every year.

First year, wheat, equal to	—	—	lb.
			3205
Second ditto, barley, equal to half a crop of wheat	—	—	1602½
Third ditto. As soon as the barley is taken off the field, plough and sow rye and black oats for sheep and lambs in the spring to feed on: In May, plough it up, and sow Buck-wheat to plough in, and on that ploughing sow a crop of cole or turnips, to be fed off with penned sheep; or sow, and feed off by penning, two vegetable crops, as before mentioned, equal to a crop of barley *.	—	—	1602½
			<hr/>
			6410
			<hr/>

R

Fourth

\* The service this practice is to sheep, and their enriching the land, will be even more than a crop of barley sowed every third year.



Brought over	—	6410
Fourth ditto, wheat, equal to	—	3205
Fifth ditto, barley, equal to half ditto		1602½
Sixth ditto, in some such manner as the		
third year, equal to	— —	1602½
Seventh ditto, wheat, equal to	— —	3205
Eighth ditto, barley, equal to half ditto		1602½
Ninth ditto, same as the sixth and third		
year, equal to	— —	1602½
Tenth ditto, wheat, equal to	—	3205
Produce of wheat, &c. for 10 years	—	<u>22435</u>

		lb.
Brought over, produce in wheat for one		
year in the drill-husbandry	—	1346
Years successive in wheat	— —	10
Produce in wheat for ten years	—	<u>13460</u>
Ballance in favour of the broad cast vege-		
table system	— —	8975

or upwards of 140 bushels per year, or in proportion to 1400 Bushels, or 350 load, equal to 3500 l. at 10l. per load, on 100 acres for ten years.

This is not an exaggeration in fact, though the balance seems large on paper.

Thus

Thus far, the height of tillage in both systems are advanced : The drill husbandry differs from the common broad-cast husbandry, on account of dung, resting intirely on the air for nourishment : From both the green vegetable system differ ; from one, on account of dung, and the other, on account of resting intirely on air.

However, as the drill-husbandry seems to be favoured in some parts, I shall, in justice to its partisans, mention what they say for it.

“ That lands so prepared will produce more than lands which are cultivated in the common way. This fact which is founded on the principles of sound philosophy, is likewise confirmed by repeated experience. That almost the whole success of the new husbandry depends, is admitted in the old husbandry ; viz. thoroughly to divide and loosen the earth : That it is not a novelty capable of giving any husbandman the least dislike to it : We all proceed on the same principle, and agree as to its effect : All of us say, the earth must be well divided, and thoroughly loosened ; but we differ in the manner of doing it. We propose a method by which the ground is much better prepared than in the old way : In this consists all the novelty :

novelty: Whoever rightly considers it, and compares it with the same principles and experiments, will readily receive it: but he that is determined before-hand not to enter into this examination, will never enjoy the benefits of it, but will continue plodding on in the old beaten track; not from reason, but because others did so before him." Duhamel.

To which the green vegetable system replies, that as its principles are also founded on sound philosophy, together with the powerful fact of continual profit, beyond either of these contending parties, hopes, that on examination, both will adopt his system. The drill system contends with the old husbandry, calling on it to adopt its manner, from a conviction of its utility. The vegetable system also, for the same reason, calls on both to adopt what facts enforceth it to do; and, as in the drill husbandry phrase to the common husbandry, "That it will never enjoy the benefits of profit while it continues plodding on in its old tract," so neither will enjoy the advantage of agriculture, unless they both lay aside their short-sighted culture.

As we are always learning, but never learned, so the vegetable system is the learning of this day.

Happy



Happy for this kingdom, and ten-fold happier the author of the vegetable system, if to-morrow would be a more learned day: If to-morrow would, like the meridian sun, illumine this nation with a more profitable, salutary system: And happy, thrice happy the husbandman, whose heart is open to conviction, be its voice from east or west; whose faculties are open to the oily juice of unprejudiced sentiments, and suck them to his breast, as the earth did Virgil's lees of oily olives.

#### SECTION IV.

##### *Of HAY.*

**H**AY of all sorts is a consequential winter food. Will the kind farmer permit me to mention a few observations, as perhaps every one might not be furnished with the principles on which hay ought to be made? Therefore,

A small proportion of philosophy informs us, that the oily juice in plants lose that power when exposed to the sun and air; and although an odoriferous smell is obtained by gentle fermentation, (such as by properly making hay) yet, when too much exposed, air, moisture, &c.  
imbibes

imbibes the smell; and whilst the sun attracts the juice, so by degrees the plant is left a mere dried insipid straw.

This odoriferous oil is in fact the presiding spirit of plants.

Vegetables, like animals, are subject to spontaneous swellings, tuberances, and ruptures, when arrived even at perfect growth in their vessels; breaking out into external effusion, of internal cause, and to more profuse discharges on being wounded.

Thus, the balsams, rasins, and gums, &c. are the natural juices of herbs, shrubs, and trees, exuding in the warmer climates, spontaneously, or from incision, and brought here for medicinal use. The plumb tree, cherry-tree, apricot, the cones of the balm of Gilead, fir, and many others, bleed, or exude a glutinous fluid with us, which, on the exhalation of its aqueous parts, concretes into a solid gum.

Hence hay should be only lightly exsiccated or dried, that the oily juice may be retained in it, (withdrawing only the aqueous part, by lightly exposing it to the sun and air, that being no part of the nutritive food) which, if the plant is robbed of, and left only a dry, sapless body, by imprudent

dent management, very little or no fermentation will be, when put together in a body.

Therefore, the exsiccation should be performed with care, removing, as before-mentioned, only the aqueous part. The more hay ferments in a rick\*, when the oily juices are only there, (provided it does not rise to a flammatory heat) the better that hay.

Its goodness will be discovered by smell and feel, when cut out of the rick. Hay that has the natural juice in it, will be more or less clammy, according to the quantity of oil retained: nay, it is often found difficult to cut more than a few strokes at a time with the hay-knife before its sides are glutined with the juice.

Hence it is why grafs for hay should be cut at the critical time of full blossom; every instant after that crisis, a dissolution draws near.

Hence also it is, why Buck-wheat, &c. should be ploughed in when the full blossoms appear, as the juice at that time in it, as well as of all the flowering tribe, is in maturity, both in quantity and quality.

To

\* Salt is an excellent ingredient to be sprinkled in a hay-rick, horses will feed better on it, and will fatten them much.



To conclude with this short definition. If odorous vegetables are boiled in water, their smell from the plant, and decoction is lost, if the boiling continues any considerable time: the volatile oil in which the odour resides, being dissipated along with the steam of the boiling liquor. If the vapour, which exhales, be caught and condensed in proper vessels, (as the common still) the oil separates from the distilled water, and rises to the surface, or sinks to the bottom, according to its gravity.

# CHAP. VI.



## SECTION I.

### *Of CORN.*

**I**T may not be improper to mention some disappointments the farmer meets with, when his expectations are even raised high, and their causes.

A late author has observed, “ That bad seasons, “ so called, falls most heavy on the bad farmer ; “ bad husbandry is often laid on bad seasons.”

The incidents commonly complained of by the farmer, are empty ears, or as some, barrenness.

Secondly, parched, or shrivelled corn ; thirdly, abortive or rickety ; fourthly, smut ; with many other anonymous terms, the whole of which proceeds generally from one cause, though variously affected : But the farmer supposes they proceed from as many causes as complaints ; some indeed,

S

he

he says, he cannot account for, his sagacity don't reach so far, although the cause is the same.

To alleviate his distress, lays the distemper on frost, cold rain, lightening, easterly winds, &c.

First, then, I shall tell the farmer, empty ears, &c. proceeds from barrenness of soil; the land is improperly tilled, cankered with dung, or, has not strength to fill the grain.

Secondly, parched, &c. this is the same which another alledges is caused by easterly dry burning winds, when the corn is near ripe. The cause proceeds, as to the first; for although there may be a body of earth to keep or retain a reasonable moisture to assist the food, while such food exists, but as soon as the food is exhausted, the earth is no more than a *caput mortuum*; this often happens when the farmer little expects it, as his land appears to him to have a good staple, or body.

When corn gives out\* (this another term) and ripens suddenly, from a seeming growing and ripening state, on sudden heat and hot piercing wind, the cause is still the same, it proceeds from a bad constitution, cannot bear to be pinched with cold, or support a strength of breathing through

\* The farmer should say, when the land gives up.



through the tender lungs; the animated support becomes inanimate, and nature gives way to its dissolution, when powerful heat overcomes the weakened stamina. Thus food in the earth ceaseth, and the juicy stamina is no more; the consequence then must fall out what it is, viz. an imperfect insipid grain, dried up for want of nourishment to support it to maturity\*.

Thirdly, abortive, &c. this ripens, but the whole is deformed; the stalks are of a bluish colour, leaves curled, the grains resemble young peas, and often times has spots in those which are quite formed, and looks like two or three grains joined together. This defect proceeds from crude fermentation in the seed at the formation of the plant; there being an imperfection in the grain, from whence abortion immediately takes place, and so continues through all the changes of growth or formation of the plant, till it produces its grain, or fruit.

This may point out to the farmer, how careful he ought to be in the choice of his seed; 'it being in that alone to prevent such a loss; as seed of imperfection

\* The farmer then says, the corn will be light, it ripened all of a sudden. This is his knowledge and consolation.

perfection will always carry its nature through the whole process of vegetation, be the ground ever so well prepared.

Fourthly, smut proceeds sometimes from the seed alone, and other times from the seed, and the food of plants.

When, from the seed alone, it is not well prepared for the ground; there are many small, weak, imperfect seeds in it; and oft times, those that are full and large, lies in the ground too long before they vegetate, and so are rendered, (by a degree of corruption) incapable of bringing to maturity its contents.

To prevent which, many directions have offered themselves to the public; two or three I shall recite here, not having mentioned them in the *Rational Farmer*.

M. Donat, near Rochelle, says, " That for seven years he never had a smutty ear: his preparation for seed wheat, is quick-lime and pidgeon's dung, of each 25 pounds, wood-ashes 40 pounds, sea-salt, or salt-petre 25 pound: put all these together into a tub large enough to hold half a hoghead of common water added to them; stir them well, till the lime is quite dissolved: This lee will keep some time without spoiling. Draw off the lee in-

to another vessel in which the corn is to be put. This quantity is sufficient to prepare 12 or 13 hundred weight of wheat."

M. Aimens. Lixiviums, among others, is by him recommended. One of Mr. Pluche's, as being worthy notice; "the lee of lime, salt-petre, alum, verdigrise, a small quantity, vitriol, common salt, and ashes of plants."

M. de St. Mesmin de Lignerolle says, "that on 100 acres of wheat, since the year 1739, he has not had smutty corn: he changes his seed every year, takes care it is well dried and full ripe; he then pours boiling water on quick lime, in a large tub; and after the ebullition is over, adds as much cold water as there was hot, and stirs it strongly together. The quantity of wheat is then sprinkled with this lee, and well turned with the shovel, and laid in a high close heap, turning it every day, and kept three or four days, or a week, before it be sown."

To which I shall add, that Columella, Pliny, and Virgil, among the ancients, not only made use of vegetable juice for their land, but used it as a steep for their seed corn. Columella and Pliny recommended a decoction of cupress leaves, or water and urine.

Virgil



Virgil in his Georgics, lib. I. says,

Some have I seen their seeds, to sow, prepare  
With nitre and oil lees, for they by care  
Will grow far greater, and be sooner ripe.

This, with what is mentioned in the *Rational Farmer*, p. 71. by taking off all weak grains, may suffice as to seed alone: I come now to consider smut, as proceeding from the seed, and the food or nutriment in the earth, or from the nutriment alone.

Smut may proceed from weakness in the seed, being carried on in that infirm state, till its time of maturity approaches; then, for want of strength, the feeble plant yields to decay; and so instead of forming its grain, it forms a distempered substance of a black dust or powder called smut, together with an aiding hand to complete its dissolution by impure and cankered juices, proceeding from acrimonious dung\*, like a consumptive man, drinking spirituous liquor.

It

\* The acrimonious steam of horse dung is very injurious to plants confined to it, as thousands can testify in the case of plants in a hot bed closely covered; or to roots of fruit trees, and

It may also proceed from aliment alone, even the purest, the most perfected grain may be injured therefrom; and that more or less, according to the suction of the plant, or quantity of such impure aliment. Thus it is in the animal creation also, the vegetable and animal bearing a strong parity in innumerable instances.

The use of steeping wheat then is this, it imbibes a quantity of food, with which all steeps are replete with, that are used for that purpose, some being more so than others, such as M. Donat's with pidgeon-dung, &c. This steep bringing on a quick fermentation in the earth by the seed being moist, and so far advanced towards it, that it is in a vegetating state, when committed to the earth, and thereby prevented from the injury the best seed may suffer, when it lies long inactive, such as mouldiness, when the earth does not close the seed, and dry weather ensue, and perhaps the ground also in a dry condition: worms  
gnawing

and there can be no reason why the parity may not hold good in the earth. Vegetable steam has not that effect on plants, as it never injures the tenderest plant when used as hot dung, even in the cloudy months of December, &c. Leaves of trees, for this purpose, is incomparable.

gnawing the grain, &c. which is prevented, in part, by these lixiviums : But, that the imbibing of lixiviums carries its virtues in the grain or plants, so as to affect the ripening corn, with great deference, appears to be a mere fabulous idea ; it being nothing more than to cause a quick vegetation, and an assisting nourishment to the embryo plant.

Hence it is, that all light lands should be made firm by some exterior additional weight, to press the earth close to the grain. For the same reason it is, that wheat in light soils should be trod hard to close the earth firm to the roots, to prevent a quantity of confined air about the roots, which would certainly cause a mouldiness and decay : Interstices round any roots, be they large or small, covered with earth, is pernicious to such root : heavy moist land being ponderous in itself does not require this aid.

. One thing further I shall mention before I leave this subject, that is, I have not seen any notice taken by authors, of a like precaution to be used with other grain than wheat, to prepare it for the ground.

Shall

Note, The error or fatality of corn being sown too thick :  
See fully explained, Rational Farmer, p. 74, 75.



Shall I stand alone convicted by all mankind, stand a culprit before my great superiors, when I affirm the great omission, in not reminding the farmer, that it is absolutely as necessary for him to take the same precaution, care, and assiduity, through every species of grain he commits to the benevolent earth, as to wheat. Methinks I hear one or two pleading my cause, and supporting the justice of my allegation,—supporting the reasonableness of the charge ; as it makes all our earthy substances denizens, and not aliens. Why should not barley, oats, &c. be equally respected, when they administer to our enjoyment in common with wheat ? Is it because they are not of equal value—too vague a word to answer ? Let me therefore recommend that duty (you owe to yourselves) as much to one, as the other ; they are all fed with the same food, and nourished in the same earthy bowels ; they are no bastards in the parent womb, but imprudently made so by an unmeaning custom.

## SECTION II.

*Observations on the PLOUGH, and PLOUGHING.*

**I**N respect to the plough, there is not an implement in husbandry requires the genius of thought more than it; the plough must be dragged after the horse at least three times every year through all your land of tillage; a circumstance requiring the aid of humanity as well as profit: even were humanity out of the question, one might think profit would be sufficient to draw attention.

Among the many ploughs\*, there are but four worthy to be mentioned for common tillage use. Namely, the Norfolk, the Rotheram, the Kentish two rung plough, and the broad-cast sowing plough†.

The Norfolk plough is one of the wheel kind, but the best constructed of any of that sort, being short, strong, and follows well: never more than three horses, and then it must be particularly heavy strong

\* Above forty sorts. In Kent they have a plough with a shifting earth board.

† When the seed is to be covered with the plough.

strong land; in common no more than two horses are used, and a man that holds and drives, ploughs from one to two acres a day.

The Rotheram, patent, or Lomax† dray plough, is the best invented plough of any; either for stony, hilly or uneven ground, it is equally the same. The body\*, or frame work, is short, strong, and light; being like the Norfolk plough in length, viz. from 2 feet 6 inches to 2 feet 9 inches, from the end of the head piece to the point of the share; both these ploughs have sock, or socket shares: and as with the Norfolk plough, so with this, only two horses and a man; though she would follow much lighter was the beam but 4 feet instead of five. The constructions are very different though equal in resistance; but the Lomax (who was the inventor) much the cheapest, as it is a swing, or dray plough, or one without wheel or foot: and when complete, with the mold board plated with iron and whipples, will cost but 30 shillings.

The

† This is also called the Surry plough, as it has been lately introduced there by Mr. Charles Baldwin of Clapham; and made at that place by Mr. Edwards, at the high price of 2l. 16s. whereas it can be made for 1l. 10s.

\* Called the chamber in some countries.



The Kentish two rung plough has had, by a late improvement, two rungs to each side instead of one; both sides being open, having no earth board, they break and pulverize the couchy grass fallow (when the horses are drove with spirit) more with one ploughing, than with plough and harrow in the common way.

The fourth or broad-cast sowing plough, is of more real use than either of the former, at the sowing season of wheat or barley. This is a small one horse plough, for ploughing in wheat under furrow; as also it is used by a judicious husbandman of my acquaintance in sowing barley in very light land under furrow.

One horse will plough two acres a day very well, if used in the same manner as the Norfolk farmers do, (*Rational Farmer*, page 91.) or one acre and a half in the common hours.

The utility of each of those ploughs, I hope appears evident to my reader; the savings from the formation of the plough, lessened expence in repairing,

Note. Let me again remind the farmer to keep his coulter steeled and sharp, in particular when buck-wheat &c. are ploughed in, the coulter should be as the edge of a knife quite up to the beam.

pairing, a clouterly boy sated, together with two or three horses out of each plough, is a saving on the whole equal to half the rent of the farm.

But when we take in the sowing season, the dispatch at critical days, which so often happens, both in wheat as well as barley sowing, by having, at 1*l.* expence each, a number of these ploughs suitable to the acres of tillage, the utility of this bauble will more amply appear.

Permit me to step a little further, and tell the industrious man that the requisites of a plough are: First, an easy entrance. Secondly, steadiness. Thirdly, compleat subversion. Fourthly, least resistance or draught. Fifthly, cheapness. And lastly, the least friction.

Thus while the connoisseur is admiring and indulging himself in his *Angelo's*, *Corregio's*, and *Titian* tints, or the beauties of an adored Venus, the good husbandman is admiring his plough: firm and strong though delicately light; eager as it were to enter the earth as soon as power begins to act; closely following the horses heels, spiritedly casting off the earth with its winged board; beam short, and handles forming an obtuse angle with the beam.

Is it not a common phrase, chearfully spoke by the tender coachman, of his carriage, to distinguish its excellence? She follows light!

Does

Does not the sea-faring man adore the ship he is in, that sails well, as a deity? They even talk of such as an animated being. See, say they, how sweetly she slides through the water, with what ease she cuts through the waves, she's like a cork on the water! &c. Each faculty endeavouring to improve the utility of construction, and every good husbandman, eager in the pursuit.

These and such like, condemns the obstinate farmer every day; arraigning his stupidity and ignorant conceited perverseness. My pen is not wanting to expose his folly; he will see it in letters of gold if he please to look into the Wiseman's book.

Oxen, being as tractable as a horse, it is surprizing they are not more used, they plough with two an acre a day in part of Essex, and only one man, even a strong soil which they think too heavy for turnips; whilst in some places the farmers are so absurd as never to plough with less than four even in barley land.



## SECTION III.

## Of L I M E.

AS Lime is scarcely ever used in some countries where it may be very readily procured; it seems as if the people in such places did not know its value or use\*. I therefore hope, that by reciting what an ingenious writer about ten years past observed on the subject of lime, will suffice, added to *Rational Farmer*, page 35.

“Lime, says he, dissolves the vegetable food, and fits it for entering the roots of plants. It dissolves all the animal and vegetable substances it meets with in the soil, and converts them to vegetable food; and by the salts which it produces it dissolves all oily substances in the soil, and conveys them into the roots of plants.”

“Lime promotes vegetation, but adds nothing of vegetable food, as it contains nothing of this  
vegetable

\* So very absurd are some that they think it will not do any service to land: nay, more absurd is the author of a book published a few years since, who says, that lime will not answer as manure, although he could burn it at 5d. per barrel.

vegetable food in itself. For instance, if land upon which lime has been laid, is exhausted by crops, the application of lime a second time has not the same effect as before, unless the vegetable food is supplied by putrefacted manure."

" But it seems, as if lime in some measure acts as a stimulus and a manure, whilst it makes the earth exert itself in the nourishment of vegetables, and in some measure also enriches it."

" In uncultivated land in which there is a large quantity of vegetable substance, lime may be used as a stimulus ; and when used as a stimulus, a large quantity is best to produce a high degree of fermentation."

My worthy author's observations are undoubtedly true, but this holds good in all manures whatever ; not one sort of manure only will maintain food for plants ; where rotational crops take place, there must be changes of manure to refresh nature.

In the common course of husbandry where marks are convenient, even there a second marling has not the same effect as the first, or the third little or none at all ; nay, is it not so with the favourite dung-hill, does that always answer the end designed ? Do you not often see it has no effect on plants ; why, because the earth has not had a change ?

change? For though a noble writer observes, that earth and nature are always the same, yet, that is meant in a passive sense. Earth will always produce grain and fruits when supplied with opposing food; and suffer itself to be modelled into any capacity.

My author, however, seems to lessen the value of lime, because it does not answer a second time; and that it does not carry with it much food, only acting as a stimulus.

I must inform the reader, that lime, marles, and even all calcinations, are only in themselves a stimulus, and in that capacity can act of themselves in the work of fermentation; but one as well as the other, having an attracting quality, the salts therein contained draws the acidity of the earth, air, and water to themselves; at this junction there is produced an ebullition, which when effected, their union becomes a neutral salt, as has been on another occasion observed, and becomes then the food of plants.

Acidity being produced from whence it may, or salts inherit any substance soever, yet neither can make the food of plants themselves. Lime, being then only in its natural state, such as other saline substances are.

U

Thus



Thus marls, or chalks, says another ancient author, “ operates chiefly by attracting oils and acids from the air; the longer therefore that it lies on the land exposed to the influence of the air, the more quickly it operates†.”

That is, the saline property it is possessed of attracts the acid; it is therefore replete with food before it be covered in the earth, and of course begins its operation immediately.

It is in stone marls partly, as with brimstone in a roll; absorbing substances lose the force of acting, when united in a large body: brimstone in a roll absorbing no air, though it does so plentifully when reduced into minute particles

He says further, “ That clay marl dissolves sooner than stone marl, therefore four loads of that is equal to five loads of the stone marl.”

Had my author pulverized stony mail or chalk, he would have discovered, that such marls are as replete with salts, as the more dissolving clay marls are. See *Rational Farmer*, page 31, 32. It is not  
the

† He must mean to lay exposed to moisture and frost in winter, for when exposed in summer most of the chalky marls hardens, instead of opening its pores: witness exposing chalk in summer to harden, designed for building.

the solidity of stone marls that lessens their merit, they will act as quick as the dissolving marls if their parts are separated\*, and are of equal value.

Doctor Home observes, that shell marl is the most powerful of any, as it contains oil, and others do not; therefore he reckons shell marl among the vegetable manures. In saturating shell marl he says, it took six times the quantity of vinegar than any other marls he had met with.

#### SECTION IV.

##### *Of the PERSPIRATION of PLANTS.*

**P**ERSPIRATION being (as elsewhere observed) the very life of plants, how injurious must it be to deprive wheat in the spring of its lungs; breathing ceases and nature at a stand, when the unpardonable man puts into his wheat the greedy sheep: Nature being then deprived, nay robbed of what it intended to prosecute the growth of the plant with. Think you she had been at work all the winter to form leaves, from the instant vegetation  
in

\* Broke small or pulverized.

in the seed began, to be pirated of its only aid at the critical time of the returning sun, when every glimpse seemingly makes nature smile? Throwing her laborious work a fortnight or three weeks back, before she can recover again her tender aid.

Nature is here foiled\* in a criminal degree, and the slothful hind injured in his crop. Dare he avow the custom? No, the wise man is ashamed of it, and acknowledges his error; pleads poverty for his ewes and lambs, having not been acquainted there were substitutes in lieu of the frost burnt grass.

It is to make known this timely relief I sit down to write; thereby, among other aiding sentiments, to acquaint the industrious man how his corn, and how his bleating ewe may be relieved in this trying, black season of wind, rain, and frost, or overwhelmed with heavy burthens of snow†.

\* If the crop don't answer the season is blamed.

† See page 11.



## C H A P. VII.



## S E C T I O N I.

*Of HOVEN CATTLE.*

**H**OVEN cattle, by feeding on clover, is often attended with fatality; to prevent which, the judicious man never puts his horned cattle into red clover when it is wet, either in dew or rain, if gross and luxuriant; on the contrary, he foils his cows with it, as the French and Flemings do theirs with lucern. When red clover is young, and cattle of any kind being inured to it in that state, and the clover kept in subjection, that fatality seldom happens. However, as man cannot guard against every evil, I have transcribed some of the cures which has been wrote on that subject;

ject; as well as some instances of relief within my own knowledge.

The heads of the following remarks, and receipe, was sent to the Editors of the Museum Rusticum, in the year 1764: "I had, said the gentleman, a yearling steer much hoven, and sent for a farrier as soon as I perceived it; he drenched him, and drove him about for some hours, without giving him any relief: He still grew worse, and the man could do no more for him, and I believe he would have died soon, having almost lost his footing."

"I then resolved to try the experiment of giving vent to the wind by an incision.

"I took notice, that he was particularly swelled and puffed out between the ribs and pin-bone, on the near side. I gave the farrier a thin incision knife, not sharp pointed, but a little rounded at the point, and made him cut through the hide about an inch long downwards, where the swelling was most, (having first secured him from moving) about three inches from the rib, and the same from the bones of the loin; then I directed him to make another incision, with the utmost caution, that it might only enter the cavity of the belly, without hurting or wounding any of the intestines,

as I believed that would be fatal to the creature.

“ The orifice was not bigger than the top of a little finger would enter, but immediately upon making it, the wind rushed out, with as much force, as if it came from a bellows, and was very foetid; it continued so for some time, and the swelling lessened by degrees.

“ We afterwards run a needle and thread through the wound in the hide, tied it together, putting a plaister on to keep the air from it, put him into a warm house, and the next day he eat some oats and hay, and in a week's time we healed up the wound, and turned him out with the other cattle; and though he did not recover himself for some weeks, he is now as fine a steer as any of his fellows.”

Another gentleman to the same editors, says, “ About two years ago I had a fine calf, near four months old, which swelled all over its body to such a degree, that I hourly expected its death, owing, as I believe, to its lying wet \*. This swelling, however, was with great difficulty carried off, by giving it internally warm and laxative medicines.

“ After

\* This ought to be a precaution against cattle lying wet in the yard, &c. as observed in my directions relative to a farm-yard.



“ After this, I sent the calf to graze with my friend, Mr. Gregson’s calves: It had not been long there, when that gentleman sent me word, the calf was greatly swelled, and in all probability must die very soon, except immediate relief could be procured.

“ I forthwith ordered one of his men, upon seeing the distress of the poor creature, to run his pen-knife, as deep as he could, through that part of the swelling which rises highest, near one of the hip-bones, and to put into the orifice the barrel of a quill, in order to carry off the pent-up wind.

“ This having been done, the wind rushed out with a surprising force, and offensive smell; and that none of this putrid fluid might be left behind, we pressed its sides together as close as possible.

“ The calf found immediate relief, drank its milk, eat some hay heartily, and continued well, till a fall of rain made the swelling return, which induced me to tap it again, and it mended.

“ Three times after this, upon catching cold, it swelled, and was tapped, always receiving sudden and surprising ease.

“ Upon

“ Upon this I had a vein opened, and the blood was, as I expected, thick, and had scarcely any serum in it, resembling that of a person in an ague ; hence, I thought a fellow-drink, such as is generally used, would carry off the distemper altogether.

“ Such a one I made, and gave it, and the calf has never had any return of the swelling since. It is now big with calf, and I trust will turn out a very fine cow.”

A French author, *Memoires de la Societ  Royale de Agriculture de Tours*, tom. I. p. 151, says, “ Clover should, at first, be given sparingly to cattle, till it purges them ; when it has produced this effect, the danger is generally over ; for the then liquid f ces are quickly expelled, and easily give way to the ready evacuation of this juicy plant, which might otherwise raise in the bowels that effervescence which proves so dangerous.”

“ As soon as a beast is hosed, some make it swallow a pound of oil of olives, and then walk it about. But the most frequent, the easiest, and the readiest remedy, because it is found every where, is immediately to milk a cow, and make the sick one swallow a quart of the warm milk ; then to walk it about slowly at first, and by degrees to

X

bring

bring it to a pretty quick trot. This generally perfects the cure ; indeed it has feldom been known to fail : The cow thus disordered, must not be fed with clover the next day. Three pints of milk may be given to a bullock."

In the year 1767, a friend of mine told me, that the preceding year he had a cow lying in great agony, which had broke into his clover, (when it was wet) she being much swelled.

On the near side\*, (that appearing to be the most prominent) between the hip-bone and the ribs, he made an incision with a pointed pen-knife, out of which orifice instantly gushed a quantity of wind, the most nauseous he had ever smelled ; nothing more was done, and the beast did well.

Sometime after, being at a gentleman's house, he informed me, that a cow was swelled much in her body, by eating clover that morning in the field when it was wet ; I begged of him to try the experiment I had been so authentically assured of its effect. Accordingly he made a perpendicular cut into her paunch, on the near side, about four inches from the hip-bone, and nearly that from the end of the bones of her back, (the cow's legs being

\* The paunch lies on the near side.



being tied, and laying down) instantly the wind evacuated from the paunch thro' the incision with great force, with a hot, fætid, and bad smell, as if it came from a nauseous fermentation; the swelling shortly assuaged, but nothing was given her for twenty four hours but a little dry hay; during which time, however, she was frequently drove about pretty fast: the cow did well.

Another gentleman told me, "He had once a bullock so much hoven, that his life was despaired of; he sent for a surgeon who was in his neighbourhood, who thrust an instrument into the paunch, on the near side; the bullock was relieved, but did not seem to find the benefit he imagined the operation might have given."

"The surgeon seemed inclinable to give him another tapping; but bethought himself, that keeping open the orifice must answer the same end, therefore got a quill of the largest size, oiled the outside, and thrust it into the incision through to the paunch, which caused more wind to issue out."

"He then ordered a clyster of such things as could there be conveniently had, which consisted of camomile flowers, marsh mallow roots, bruised together, carraways, aniseeds, juniper, and bay-berries.

berries, coriander, and long pepper, bruised, all of which were boiled in upwards of three quarts of water, till it was reduced to less than two quarts, then strained off, and a handful of salt, and a pint of sweet oil added.

“ This was administered in the clyster way, by the assistance of a long tube, which perfectly cured the beast; the quill was taken out as soon as the operation was over, and the orifice closed up very tight; the incision being made up and down, the weight of the belly contracted the lips of the wound together.”

Thus you have many proofs of the effect of making incisions, or tapping; the principles are the same in all, though varying a little in the manner.

I own, that though cattle may do very well from tapping only, yet it seems natural to give a clyster where the intestines are over agitated with wind.

I shall not presume fully to account for this extraordinary cause proceeding from one or two vegetable foods, and not from others: but it seems as if clover had a tendency to cause a more powerful and hasty fermentation in the bowels of the beast, than other grass; so that when sheep, cows, &c.

&c. are turned into this luxuriant food hungry, they eat so voraciously, that with its quantity, and perhaps also some undigested or foul fæces or dregs interrupting a quick digestion, the mass is so powerfully excited, and the air in the paunch thereby so much rarified, causeth a distention of the body. This has sometimes happened to pigs, but very rarely; indeed, no very hungry beast can be said to be safe if put into luxuriant red clover, if wet, and continued in it so long as to fill their bellies, unless previously inured.

## SECTION II.

### Of RED WORMS, &c.

**R**ED worms, so called, that often eat corn just under the surface of the ground.

There are three sorts of worms that affect corn; but writers on agriculture mention only two: They are, first, the red, or chesnut worm; secondly, the field maggot, or rook worm; thirdly, the small white maggot.

The first, or red worm, is from half to three quarters of an inch long, has a scaly shell covering,



ing, full of joints, many small legs, a pointed head, which seems to serve as forceps to cut off the plant, and are about the size of the largest knitting needle, and of a chesnut colour.

The second, or large field maggot, called also the rook-worm; attends the ground when ploughed up, where these maggots are. This sort is very large, white, and soft, with a blackish head, and turns, in the course of the summer, to what is generally known by the name of black, or dung beetle; of which, many are found in pastures under cow and horse dung, particularly among the former.

The third, or small maggot, is soft and white, like the second, near as small as the first, but shorter.

This sort, where it happens, is equally destructive as the first, both being much more so than the second.

Former authors on agriculture, seem to have been silent about the destruction of those enemies to corn. In the year 1762, an industrious farmer in Ireland told me, they had some few years before been troublesome to him in all his fields, most of which had been reduced to tillage from furze-land :

land\*: Without any idea of destroying this troublesome worm, he bought a quantity of Irish salt, and laid out at the rate of six bushels on every acre, plantation measure, nearly four bushels, or two hundred weight† to a statutable acre: This he sowed on a fallow in March, dragged the ground well, then ploughed it in, and twice more ploughed it before he sowed the wheat, dragging it very deep after each ploughing, that the salt may be well blended with the earth. The agreeable consequence was, a fine crop of wheat, and the worms destroyed.

He had now two tempting objects opened to view, enriching his land, and destroying his enemy; which he persevered in through every field, to a comfort of seeing corn-ricks increased, and the worms eradicated.

This

\* Furze-lands are too often infested with this worm, but I have known them in great abundance in strong, cold, meadow land, when ploughed up.

† Fifty-six pound weight of dry salt is a bushel; this makes nearly one ounce of salt to a square yard. This salt has an uncommon quantity of acrimonious acid in it, more than salt in general, being made of sea-water, and rock salt from the salt-pits in Lancashire; so that there is as much acrimony in two bushels of such, as three of Limington salt. In Ireland, salt is about two shillings per bushel.

This undoubted instance of the effect of salt on those carnage worms, I communicated to the Dublin society, who ordered their experimental farmer, Mr. Baker, to go through a course of experiments, to find out what would destroy them quickest, and answer some end towards enriching the land.

Accordingly, in the year 1764, he made the experiments as under, which was communicated to the society in 1765.

#### Experiments on RED WORMS.

“No. I. I put ten red worms into a wine glass, with common salt in it. They were all dead in 4 hours.

No. II. Into a glass with brine in it I put ten red worms. They were all dead in 6 hours.

No. III. Into a glass with lime in it, which had been slackened for a long time, and exposed to the weather, I put the like number. They were dead in 44 hours.

No. IV. Into a glass with the above lime, and some water in it, I put the like number. They were dead in 20 hours.

No. V. Into a glass with lime, newly slackened,  
and



and when cold, I put the like number. They were dead in 14 hours.

No. VI. Into lime-water, made with cold water \*, I put the like number. They were dead in 10 hours.

No. VII. Into a glass, with foot in it, I put the like number. They were dead in 4 hours.

No. VIII. Into foot and water, I put the like number. They were dead in 4 hours.

No. IX. Into fair water, I put the like number. They were dead in 52 hours.

No. X. Into a glass without any thing in it, I put the like number. They were dead in 32 hours."

"By these experiments, we see all the articles used will kill this insect in a short time, particularly the salt and foot." This much Mr. Baker.

When lime may be used, either for manure, or to destroy the red worm, I should recommend 160 bushels of it unslacked, to a statutable acre; spread it in that state on a former ploughing, and plough it in, that it may slack in the earth. By

Y

this

\* Lime-water made for medicinal use is always made with boiling water, but as that cannot be in the case before us, I therefore used cold water.

this means the volatile part is preserved within the bowels we want it to nourish, or to destroy the worms: In other manners of slacking lime, the subtle saline particles are evaporated in the air, and, of course, the first degree of power is lost.

The high price of salt in England renders it a dear manure; in particular in some parts, not less than five shillings a bushel \*. But that not being the case in France, they can use it to much advantage there.

The large quantity of bay-salt made in Bretagne is almost incredible, particularly at Borneuf, Cuerand, and Croissil: In the Bay of Borneuf alone, are computed above twenty thousand considerable salt-works. From thence the Baltick is supplied, particularly Poland, where, besides the ordinary uses, it serves in tilling the ground, being found to warm it, and to prevent little vermin from gnawing the grain.

The elaborate chymist, John Rudolph Glauber, (whose name deserves to be written in letters of gold) among many other useful experiments on salts, relative to their vegetating quality, found, that no manure of the kind had such power in tillage, as sea-salt calcinated in a lime mixture.

His

\* In other parts for 4s. and 4s. 4 d. per 56 pound weight.

His prescription is this,

“ To every four hundred weight of lime slack-  
ed in the air, add one hundred weight of common  
salt, temper these together with urine to a stiff  
mortar, which make into small oblong rolls, and  
dried; when done, lay a layer of wood, then a  
layer of these rolls, and so on till the quantity is  
piled up, which set fire to, and let the whole  
burn out, taking care, that no rain or wet get to  
the lime in slacking, or these mortar rolls in burning.

“ When burnt, powder it fine, and let it ly  
half a-year, often turning it, in a dry place in the  
air, that it may be contempered and animated by  
the air, or sown on the land so long before th  
seed be sown \*.”

In the first case, a fallow may be saved by  
having it ready prepared, and sowed with wheat  
immediately after oats, barley, pease, &c. where-  
by a crop may be produced instead of a wasteful  
fallow, and a rich manure to destroy the bane-  
ful insect.

I would sow five hundred weight per acre,  
which is three pounds and a half to a square  
perch,

\* To destroy the acidity effectually in the salt, lime is u-  
sed, being a great absorbent. Hence lime water, and soap  
pills, in which are a large quantity of alcalies, is prescribed  
for the gravel, &c.



perch, and either harrow, or plough it in with the wheat.

The next consideration may be the expence: this must differ, as the ingredients differ in price.

	s.	d.
But suppose 4 hundred of lime, at	-	4 0
1 ditto of salt	-	8 6
		<hr/>
		12 6

that is, 2 s. 6 d. per hundred weight, and 12 s. 6 d. per acre.

This expence bears no proportion to the advantage arising therefrom, when we consider its utility in destroying every worm, in preventing the ground being loaded with filth from the dung-heap poison, and its fertilizing property.

Thus we have that useful salt reduced to a certainty of safety: The great quantity of acid\* which sea-salt abounds with, by calcination is made useful, being mixed with a quadruple quantity of lime, and calcinated together, the lime then absorbs the fiery acid of the salt, and makes together one of the most powerful manures of any known; as observed by a commentator on Glauber's works.

\* It is the quantity of acid in sea-salt that prevents vinegar from having any effect on it; but when calcinated, vinegar acts on it as on other vegetable salts.

## S E C T I O N

## SECTION III.

## On Mr. YOUNG'S HUSBANDRY.

**I**N short, the grand article of husbandry, is not what Mr. Young says it is, keeping great stocks of cattle; "for without much cattle, says he, there cannot be much corn." It is, on the contrary, prudence, sensibility, discernment, &c. where an ingenious man will do the work with ten horses, that another would employ twenty to do the same.

The dung he has from the common stercoreary to lay out on pasture. The true principles of farming therefore are:

First, to sow his corn with judiciousness in due season.

Secondly, to manure his land often, with cheap, profitable, and wholesome vegetables, in their prime of native salts and oily juice. Thereby preventing weeds, and save weeding.

Thirdly, sensible and discerning to keep his land thus clean, thus enriched, whereby a ten-fold profit may arise; for earth will never deceive its cultivator, if the cultivator don't deceive it.

It

It is a number of expensive horses, and idle servants, that are the bane of farms. It is not a ploughman, or one that can talk of ploughing that makes a good husbandman. *Farmer*, is a corruption in the term of agriculture, he may be one that holds a farm, and hold 10,000*l.* a year, yet not a husbandman; not a speculative judicious man who carries reason in both hands, and the science in his understanding\*; who consults with nature, and improves at every consultation: these are the grand articles: numbers of profitable cattle comes of course according to the situation of the land. To determine what number of each sort of cattle must be fed on a farm, is to lay down a rule inconsistent with nature: 750 acres may feed double of one sort of cattle, than another 750 acres may: quantities must differ according to quality.

However, I shall mention what Mr. Young has laid down as sufficient to feed or fatten various cattle.

“ Thirty

\* I think Mr. Pope's observation, in his Essay on Taste, may be aptly applied here, where he says, “ There is something more than taste, 'tis sense.” So there is something more in husbandry than ploughing, sowing, and harrowing, 'tis an understanding of the science, without which man is but a grub in husbandry.



“ Thirty head of draught cattle should have 24 acres of clover; 24 acres of grafs for summer food, and perhaps 30 acres (60 tons) of sainfoyn hay, and 5 of grafs for winter\*.

“ Forty acres turnips, 20 acres burnet, to winter 500 sheep.

“ Thirty acres carrots, 20 acres sainfoyn hay, will fat in warm sheds, 100 sheep of 5 stone each.

“ Thirty acres cabbages, 20 acres natural grafs hay, will winter 150 cows.

“ Twenty acres cabbages, 10 acres clover hay, will winter fatten 80 steers, or heifers, of 40 stone, plentifully.

“ Eighty acres clover hay, at 240 tons, and 60 acres turnips, will serve well to winter keep 240 oxen of 60 or 70 stone.

“ Fifty acres pease, 50 acres potatoes, and 10 acres carrots, at a moderate computation will fatten 400 large hogs.

“ Ten acres carrots, with the assistance of 50 dairy cows, and the offal corn of the farm yard, will winter keep 20 sows and wean all their litters throughout the year, in number 280.

“ Note,

\* These for common use.

“ Note, the 240 oxen are to be summer fattened after the winter feeding with 480 acres of grafs.

“ The 500 ſheep to be ſummer kept on 60 acres clover.

“ The 150 cows ſummer kept on 50 acres lucern.

“ And 20 acres of clover for young pigs after they are weaned.”

Theſe are indeed vague aſſertations, as 40 acres of turnips†, that is, ſuch a quantity as an acre ought to produce, will feed without the aſſiſtance of burnet, nearly 500 ſheep. Had that gentleman minutely weighed quantities to theſe individuals, he could then, from repeated experiments, have formed other more certain directions.

Mr. Young ſeems to have ſpent a great deal of time, and taken much pains to inform himſelf and the world of what is doing in agriculture, but he ſeems quite ignorant of the foundation and principles of that ſcience; he is quite unacquainted with any other rudiments but the old ſyſtem of dung. I muſt own, it did not a little ſtartle me, when he was ranging the degree of farmers, who,  
and

† Turnips will keep good through April, by depriving them of the ſprouting part juſt as they begin to ſhoot, and laid in holes in the ground free from air or wet.

and who was not intitled to hold a farm ; that is, no man to hold a farm under a stipulated rent, as having not substance to go through with it, as it took a large sum of money to procure a stock of cattle. To use his own words, “ To make a farmer, he must be at a great expence for cattle to “ make a large quantity of dung.”

I do aver, he need not be at half the expence he is generally at, through every part of the business. And as for dung, if Mr. Young has no other use for it than in tillage, his ideas are very narrow.

Another declaration of Mr. Young also much staggered me, as coming from one of his reputation. viz. “ That two mowings of clover does more good “ to the ground, than feeding it off with cattle†.”

In every other instance of pasture, mowing impoverishes the land, and grazing enriches it. As it is so singular an opinion, it would have been but becoming Mr. Young, to have explained his sentiment. For rely on it, every stroke or action in all sciences, carries with it a judicious reason of fact : there are often reasons given that are not facts, but there cannot be a fact without reason.

Z

S E C-

† I hope he means an exception for pigs.



## SECTION IV.

## Of LUCERN.

LUCERN having been sufficiently mentioned in the *Rational Farmer*, I shall only just mention what Christopher Baldwin, Esq; at Clapham, Surry, told me in May last. “ That he was an advocate for drill lucern on his entering into rural life, but was now sensible it was too complicated and troublesome to pursue a quantity in that manner; therefore had let it run without horse-hoeing the spaces between, and would sow the next in broad-cast. That he sold it to hackney coachmen at 7*d.* every 60 pounds weight green, or 6*s.* per week for what a horse could eat; one acre served five horses 21 days, which he cut four times in the summer, so that every cutting brought him in 4*l.* 10*s.* or 18*l.* in the season: that a large horse eat 90 pounds weight every 24 hours. Each acre produced 16 tons 17 hundred and an half green food.”

S E C-

## SECTION V.

*Hints to the MASTER of a FARM.*

I Cannot avoid giving a second hint to the master of a farm, who may perhaps have many unprofitable acres of dry flinty ground, which he labours to cultivate, though they scarcely ever pay in tillage.

A near friend\* of mine had a quantity of such land belonging to his farm, which he told me never paid the expence of ploughing and sowing: he was advised to sow sainfoyn, but many solicitations were made before he could be prevailed on to sow it; which however at length took place, beginning with a small quantity, which has now increased to 40 or 50 acres; equal from 5*l.* to 6*l.* a year per acre.

It is really much to be pitied, that man will be so perverse, and lose years before he can be prevailed on to do himself so much good: it indeed only

\* Mr. Pittis of Wimmering near Portsmouth, joining Portsmouth Down.

only serves to convince one, more and more, of the clog with which those people are pestered. §

But still more absurd are those who have known the advantage of it on the same lands \* they now enjoy, previous to their holding, yet will not embrace the advantage ocular demonstration has furnished them with. How then can I expect to move the power of obstinacy with pen and ink.

These incomparable grasses carry their sterling worth in every leaf, when we consider the soil they so delightfully flourish in: it is there the intrinsic value of kind providence sheweth itself, by giving man a food, which by its natural penetration into the burning sand †, or piercing even the flinty fabric ‡, defies the scorching sun beams.

S E C.

\* Shalcomb farm, Isle of Wight, where it was first cultivated in that Isle on a piece of flinty ground taken from the Down.

† Lucern.

‡ Sainfoyn sends deep roots into the earth below the sun's influence.



## SECTION VI.

*Of WOOLLEN RAGS on DRY MARLY LANDS.*

I Cannot omit mentioning the pains people are at in some parts of England to obtain a little produce from their dry marly lands; such as the country about Dunstable in Bedfordshire, where they procure woollen rags at a high price (they sow 24 bushels to one acre, at 4*d.* a bushel) to scatter on their land, and either plough or prick them in with a stick. This land being intirely on marl and flints, dung is a hot poison to it; so that the only substitute they can obtain are woollen rags which retain moisture, and in some measure assists the land.

What a pity it is that vegetable manures are not known among them. Those hot burning lands may be tempered to yield five times what they now do. May be tempered to produce clover, and thereby have the advantage of the cool fattening dung of profitable beasts\*. Sainfoyn is natural to such land, yet they are totally ignorant (or obstinate of its utility.

S E C.

\* Feeding hogs on such land would enrich it beyond any other manure.

## SECTION VII.

*The SPANIARDS method of FEEDING SHEEP.*

**T**HE Spaniards being very attentive to their sheep, lay salt on the rocks in their wilds for the sheep to lick as they feed about, which keeps them sound and causeth them to eat more earnestly, particularly when continued long on the same pasture. Hence oxen thrives much when salt is sprinkled among the hay: and horses are so fond of salt, they will, when used to it, follow the person about to smell his pockets for it. *See page 51, and bottom remark page 127.*

C H A P.

C H A P. VIII.

\*\*\*\*\*

S E C T I O N I.

Of BURNET.

THE most sanguine advocates for this plant seem to lay their fort on its value, on account of the food furnished from it in the spring for sheep. This also is the opinion of Mr. Young, who says, “ Burnet I only introduce for a peculiar use, viz. feeding sheep late in the spring. “ I do not apprehend, from the experience I have “ had of it, that it is for other uses comparable to “ clover, sainfoyn, or lucern.”

If that be all its use it is useless. A substitute for the spring I have already mentioned, of much more propriety in respect to the course of tillage, and of equal benefit to sheep. Such as rye, &c. See page 8.

However,



However, if the following letter, which I found in the repository of Agriculture No. 2, may answer any end, it is under transcribed, being a little curious.

*Extract of a letter from Mr. Henry Rigal, of Heidelberg, in the upper Palatinate of Germany, to Mr. Cressinus, of London.*

*Heidelberg, Oct. 18, 1767.*

“THE culture of burnet will, I believe, take sooner in this country than in many others. My reason for thinking so, is, that I find every body highly prejudiced in its favour, partly from the two following circumstances. Horses afflicted with the cancer have not yet failed to be cured here, by feeding them with burnet mixed with straw. I am pretty certain of its efficacy in this case.

“The other quality which has recommended burnet to us, is, that some leaves of it, put between the breasts of a wet-nurse, whose milk has failed, even intirely, will bring her milk again in a few days. When I left your happy island, last winter, I brought over with me a little burnet feed, just enough to produce me as many plants

as

as many plants as were sufficient to feed a goat a week. The goat before she fed on the burnet, yielded a full glass\* of milk a day: the day after she had burnet for the first time, she yielded a pint; the next day she yielded two pints, and continued to do so till all the burnet was eaten; after which her milk was in two days reduced to its former quantity of a single glass."

Hence I shall only observe, that if the poor goat, living on no other food but heath, &c. had only a belly full of good grass, she would have shewn thanks for her food.

## SECTION II.

### Of MANURES.

**N***EW System of Agriculture* observes, what quantity of manures, that are fit for light sandy soil, should be laid on one acre, and immediately ploughed in†.

A a

25 Load

\* Half a pint is a German glass.

† In particular the 1st, 4th, 5th, and 6th, as also chalk marl if it be pulverized. I suppose the 3d sort is clay marl.

Note. Chalk marl in the Isle of Wight is very unctious and soluble. Some chalks are hard, and scarcely dissoluble, which renders such of less value.

25	Load of the product of the stercoreary	1ft.
30	Ditto chalk — — —	2d.
100	Ditto marl — — —	3d.
20	Ditto sheep dung mixed with earth	4th.
20	Ditto sea-ooze — — —	5th.
50	Ditto mud — — —	6th.

Mr. Worlidge says, “ Good marl gives syrup  
“ of violets a green colour, as all absorbent earths  
“ will.

“ That as chalky land is naturally cold requires  
“ warm applications. Chalk marl is adapted to  
“ improve light dry ground.” To which I shall  
add, a mixture composed of sea-weed, stone or  
shelly marl pulverized, and earth, is the best  
mixture in the world for such land.

### SECTION III.

#### *Of TURKEYS.*

**T**URKEYS being in general a tender bird to  
raise, I shall give my reader what a Swedish  
author on husbandry has said. “ Most of our  
House-wives have long despaired of success in rear-  
ing



ing of turkeys, and complained, that the profit rarely indemnifies them for their trouble and loss of time: whereas, little more is to be done than to plunge the chick into a vessel of cold water, the hour, or as soon after as can be, the day it is hatched, forcing it to swallow one whole pepper-corn, and then restoring it to its mother. From that time it will become hardy, and fear no more cold than a hen's chick. After which, it must be remembered that these useful creatures are subject to one particular malady whilst they are young, which carries them off in a few days. When they begin to droop, examine carefully the feathers on the rump, and you will find three or four quills partly filled with blood. Upon drawing these the chick recovers, and after that requires no further care than what is commonly bestowed on poultry that range the court yard. Two parishes in Sweeden have, for many years, gained several hundred pounds by rearing and selling turkeys."

Something similar to part of the above account, is the attention of some House-wives when they fatten geese, namely, to cut away the feathers on their rump.

Now

Now I am on this topick I shall mention what was published in *St. James's Chronicle*, May 10th, 1770.

“ A gentleman in town has laid before a very learned body, a new invented method of hatching chickens, and rearing them quicker for the spit than was ever before discovered; for which that respectable society has honoured him with a gold medal. The process is as follows: The chickens are to be taken away from the hen the night after hatched, and fed with eggs boiled hard and chopped fine, mixed with bread, as larks and other birds are fed, for a fortnight; after which give them oatmeal and treacle, so mixed that it will crumble; of which the chickens are so fond, and with which thrive so fast, that at two months end they will be as large as full grown fowls.”

I shall next lay before my reader some few observations made by a gentleman, and published by order of the Dublin society in 1764, on the premiums given by that society for sowing an acre of land with 16 pounds of wheat.

## SECTION IV.

*Observations on the Premiums of the DUBLIN SOCIETY.*

“ **T**HERE are few who have considered the natural fruitfulness of all kinds of grain, that are not fully persuaded, that greater quantities of seed are generally sown in all kinds of tillage, than are requisite to obtain better crops than our lands produce.”

“ The necessity of sowing so much seed seems to arise from the defect in our tillage. Our land is not generally reduced to a proper tilth before it is sown. The corn is not equally covered with the plough, by which means great part of it is exposed, and devoured by birds and vermin; another great part is buried too deep, or covered with clods and lumps, thro’ which it cannot grow; and some part coming up too thick is starved, and dwindles for want of sufficient nourishment from the earth.”

“ In the present manner of tillage, where fifteen to twenty stone of wheat\* is generally sown in an acre,

\* Fourteen pounds to the stone.



acre, the farmer is pretty well satisfied with an eighth or ten fold; twenty fold would appear very extraordinary: whereas we are assured from undoubted authority that a single grain of wheat has produced eight hundred, nine hundred, nay a thousand grains."

" But too much is not to be concluded from a few grains sown, and probably nursed with extraordinary care. But from an acre in different parts of the kingdom, sown with a quantity of seed much smaller than ordinary, something might possibly be concluded, to prove what quantity, with proper tillage, might be sufficient. This consideration induced the Dublin society to promise the following premiums."——Abridged.

" To the person who shall produce the greatest quantity of wheat, on not more than one plantation acre of land, from not more than 16 pounds of seed.

" For the greatest quantity 30*l*.

" For the second quantity 20*l*.

" For the third quantity 10*l*.

" For these premiums the six following competitors appeared.

" 1st,

“ 1st, Bellingham Boyle, of *Ratbfarnham*, in the county of Dublin, Esq; whose acre produced 3122 pounds.

3122 pounds weight\* intitled to 30*l*. For every pound received 195 fold.

“ 2d, Mr. Patrick Ford, of *Abbotstown* in the county of Dublin, whose acre produced 2198 pounds.

2198 pounds weight, intitled to 20*l*. For every pound received 124 fold.

“ 3d, Mr. Charles Moran, of *Bray*, in the county of Dublin, whose acre produced 2002 pounds.

2002 pounds weight, intitled to 10*l*. For every pound received 137 fold.

“ There being but three premiums, the three other candidates not producing so much as the last or third, they were not intitled to a premium. However, the

4th, Mr. Kearney received 105 fold.

5th, Mr. Falkiner ditto 87 fold.

6th, Mr. W. Ford ditto 83 fold.

“ Mr.

\* Equal to 30 bushels and an half, per English acre, at 64 pounds per bushel, and in proportion of 9 pounds, 14 ounces, 6 drams of seed; distance of plants 8 inches square.

“ Mr. Boyle’s account of his method being the most simple, shall just mention it. The land was well ploughed, and the corn sowed on broad sets, and harrowed in, and twice weeded.”

The usefulness of societies for encouraging agriculture, arts, and sciences, are pretty well known. The Dublin society was the first that set the noble example, by charter granted in the year 1750. Scotland formed the second, and the society in London followed them.

In France, there are thirteen societies established by royal approbation, for the promoting of agriculture, and under them they have nineteen co-operating societies.

In Sweden the art of agriculture is taught at the university, as it is also in the German universities.

In Poland it is much improving, as also in Denmark.

An academy in Tuscany is established for agriculture only. And the Neopolitans, have condescended to return to the study of agriculture.

These

Note. The Dutch load from the Baltick and German ports, 1000 sail of ships annually for themselves; they never buy from us but when wheat sells at 24s. per quarter. The German labour is but 2d or 3d a day, land in proportion.



These things denote that there is something more in agriculture than holding the plough ; it denotes that it is a philosophical study, a science worthy the attention of the learned ; and that to accomplish a man for the prosecution of this science, it is necessary he should be a learned man, otherwise he cannot be capable of discerning into the chymical and machinery systems, on which agriculture is dependent ; other requisities are necessary, the mathematicks, how bodies operate on each other, and the principles of mechanism, &c. all which are necessities to complete a husbandman : Accomplishments may make a ploughman, but not much less to make a useful cultivator, or one who takes on himself the title of farmer.

However, I would not willingly bear too hard on that name ; some few exceptions there are ; some few there are who has very judicious and discerning sentiments, well capable of pursuing a sensible system, making just observations, and drawing conclusions from thence, who may not perhaps be altogether so fully learned in all the scholastical branches ; but he must be a good logician, to make a reasonable proficiency beyond the common knowledge of farming men. Or, he may make a good hus-

B b

bandman

bandman, though he cannot fully instruct, if he will be instructed. The societies, universities, and academical bodies of learning, does not say, that every farmer must be there instituted personally, that is impossible; but every farmer may be instituted by instruction from those learned studies, formed on a series of experimental philosophy and due practice: and many greatly improve further on their studies; as perfection rests no where, it is not in man, or in any body of men; for we often see great improvements made on the works of others, by people much lower in learning than the noble inventor of those works were.

But what must these improvements proceed from? From obstinacy, and self-conceited ignorance. No, they proceed from conviction, that there is something more to be learned; that conviction falling on a rational, stimulates a justifiable ambition in the faculties, to improve and excel.

## SECTION

## SECTION V.

### *One Acre of Land considered as Debtor and Creditor.*

**L**ET us next consider how a farmer stands in respect to debtor and creditor with his farm, part under tillage; which seem to be composed of the following articles.

- 1st. The value of land, or landlord's rent.
- 2d. Labour, or charges accruing.
- 3d. Brokerage exerted about it, or the tenant's part.

I shall, in order to ascertain the proportional charges, &c. suppose an acre of land in prime  
tilth,

Note. Mr. Patrick Ford of the county of Dublin, Ireland, in the year 1764, sowed an acre of wheat (English measure) with 43 pounds 12 ounces of seed, which produced 50 bushels 1 peck, and 2 quarts, for which he received a premium of 10 l. That quantity of seed per acre, nearly divides itself to three inches and three-fourths distance. Mr. Ford declared, that his land was only well tilled, and not a weed to be seen, or had ever laid any dung on it.



tilth, producing 51 bushels per acre, at 4 shillings per bushel amounting to 10 l. 4 s.

Shall allow one bushel\* of seed per acre, as being fully sufficient against every enemy.

*First.*

*l. s. d.*

To value of the  
land as extraordi-

nary - - - -  $\frac{1}{12}$  - 0 17 0

*Second.*

To feed - - -  $\frac{1}{51}$  - 0 4 0

To reaping, &c. - -  $\frac{1}{34}$  - 0 6 0

To carting, &c. - -  $\frac{1}{34}$  - 0 6 0

To tythe - - -  $\frac{1}{10}$  - 1 0  $4\frac{3}{4}$  &  $\frac{2}{10}$

To ploughing, &c. -  $\frac{1}{34}$  - 0 6 0

To threshing - -  $\frac{1}{16}$  - 0 12 9

---

3 12  $1\frac{3}{4}$   $\frac{2}{10}$

*Thirdly.*

Brokerage, or trou-  
ble exerted about

it - - - - 6 11  $10\frac{8}{10}$

---

Value per acre - 10 4 0

Hence

\* Nearly divides the seed at three inches square.

*l. s. d.*

Hence the first and second articles of land, &c. debtor to

one acre - - - 3 12  $1\frac{3}{4}$   $\frac{2}{10}$

Third, or profit arising, neat

as creditor - - - 6 11  $10\frac{8}{10}$

Or, as per first and second articles, debtor *s. d.*

to one bushel ———— 1 5

Third, or profit, neat on ditto, creditor 2 7

Value per bushel ———— 4 0

I shall now state an acre at the general price of land, and an easy produce, namely, rent at 10 s. 8 d. per acre, and produce 32 bushels, at 4 s. per bushel, 6 l. 8 s. sowing one bushel per acre, as before \*.

*First.*

\* See Rational farmer, p. 77. An yield of forty bushels per acre from not more than seven pounds of seed.

And p. 78. same book. An yield of ninety-nine bushels from one bushel of wheat, on two acres.

*First.*

*l. s. d. pts.*

To value of the land,

or rent of one acre -  $\frac{1}{12}$  - 10 8 0 0

*Second.*

To seed — -  $\frac{1}{32}$  - 0 4 0 0

To reaping, &c. -  $\frac{1}{32}$  - 0 4 0 0

To carting, &c. - -  $\frac{1}{24}$  - 0 5 4 0

To tythe ——— -  $\frac{1}{10}$  - 0 12 9 5

To ploughing, &c. -  $\frac{1}{24}$  - 0 6 1 3

To thrashing ———  $\frac{1}{16}$  - 0 8 0 0

---

2 10 10 8

*Thirdly.*

To brokerage or trou-

ble exerted about it - 3 17 1 2

---

Value per acre - 6 8 0 0

Hence first and second arti-

cles of land, &c. debtor

to one acre ——— 2 10 10 8

Third, or profit arising neat on

one acre, creditor ——— 3 17 1 2

Or, as per first and second article, *s. d. qrs. pts.*

debtor on one bushel — 1 7 0 3

Third



Third article. Profit neat as cre-	s.	d.	qrs.	pts.
ditor	2	4	3	7
Value per bushel	4	0	0	0

The difference of profit on one bushel, between 32 bushels per acre, and 51 bushels per acre, is 2 d. 0 qrs. 3 pts. or, on the acre, a profit of 8 s. 9 d. 3 qrs. 3 pts. and on 100 acres, a sum of 44 l. 1 s. 10 d. 2 qrs. upwards of half the rent of the land, held at a high rate, and nearly the full rent of good land in common.

Hence, we may form a sum of profit in a rotation tillage, allowing for neat profit the first year under wheat, as per p. 122. 6 l. 11 s. 10  $\frac{1}{4}$ , other fractions I shall leave out.

	l.	s.	d.
First year -	6	11	10 $\frac{1}{4}$
Second ditto -	3	5	11 $\frac{1}{8}$
Third ditto -	3	5	11 $\frac{1}{8}$
Fourth ditto -	6	11	10 $\frac{1}{4}$
Fifth ditto -	3	5	11 $\frac{1}{8}$
Sixth ditto -	3	5	11 $\frac{1}{8}$
Seventh ditto -	6	11	10 $\frac{1}{4}$
Eighth ditto -	3	5	11 $\frac{1}{8}$
Ninth ditto -	3	5	11 $\frac{1}{8}$
Tenth ditto -	6	11	10 $\frac{1}{4}$
Neat -	46	2	11 $\frac{3}{4}$

One

One year with another, neat profit per acre 4 l. 12 s. 3 d. 2 qrs. 3 pts. or yearly on 100 acres 461 l. 9 s. 9 d. 2 qrs. and on 100 acres in 10 years, the neat amount is 4614 l. 17 s. 10 d. a very respectable sum.

It is not what land does, but what land may be brought to do : Indeed, were many of the short-sighted farmers ideas to take place, learning and instructions would never be of use. If you tell a man what he already knows, where is the use of such information ; and to tell those, what they do not know, they will not believe you \* : However. I hope, there may be ten found in each county to save it.

## SECTION VI.

### *Remarks on thick sowing.*

**A**UGUST the 10th. 1770. This summer season having been particular, in respect to weather, has furnished man with a recent and strong

\* The author, with such people, is immediately condemned for a blockhead of a writer, they think that a sufficient answer to cover their own ignorance.

strong proof of the injury done to corn sown thick.

The first part of the season was very cold, attended with rain, which continued 'till about the 20th of July. The moist weather drew up the wheat very high, so remarkable, that many stalks measured 6 feet 3 inches : And, in general, where the ground was good, and wheat thick, it run to 6 feet 6 inches : Where less thick, to 5 feet, and 5 feet and an half. The former, by its crowded state, for want of air, drew each other up to a weak unsupportable straw, the moisture continually lying among it, caused those stalks to be a soft watery substance, so that even the first gentle shower which came after it was in ear, laid it down, (although perfectly calm) by the weight of that little moisture added to the then but light ear, the stalk being not able to stand under it, and so weak and insipid they were, that they did not rise again, although hot dry weather, and gentle breezes ensued, but more and more fell to the earth. This was not one field only, but every field, and parts of fields, where it so happened to be thicker than other parts, and the land at such places better than others.

C c

Where



Where wheat was thinner, and air admitted, that was not the case, it stood firm, and is now ripening fast to repay the farmer's trouble, whilst the other will not yield its seed \*.

How many instances we have yearly from vegetables, and none more so than from wheat, of that pernicious custom ; large quantities lodging every year. What is the observation made by the master ? Only this, the wheat was so rank that it lodged, and to pursue the same mode the next year.

There is one fatality that may befall wheat, that human creatures cannot ward off; that is, cold, wet, windy weather at the wheat's blossoming ; a continuance of which greatly obstructs the wonderful operation in nature at that critical time ; the blossoms, both male and female, being injured

\* At this time, September 1st, such corn being reaped, turns out very light : And it is the general opinion of people, the yield will fall much short of the two last indifferent years : A good harvest season only can save us.

I am now arrived to the 29th of September, and from the 16th to this day, much wet bad weather has visited this Isle. The cold late farms have suffered much in the harvest work. This should be a lesson to such, to sow early. Wheat now at 10 l. 10 s. to 10 l. 15 s. Winchester measure, in the Isle of Wight.

ed by beating against the ears, and the farina washed out of its cup, and lost, preventeth the junction, and a generative action necessary to complete the whole system.

This, I say, is not in man to assist, or repulse, it being in the hand of God alone; every other act towards obtaining seed, is appointed for man, that he should till the ground, and God give the increase.

Therefore, if man do not take the wisest, and even every the minutest step towards obtaining the the end, he flies in the face of Providence, and arraigns divine goodness.

I cannot avoid taking notice of a remark made by the ingenious Mr. Hales, as being proper to this subject, who says, " These plants which are overshaded, or too replete with moisture, cannot so well imbibe air; therefore, though they will shoot out fast, and have much wood, they will be more barren in proportion.

" If the perspiration and attraction of the lateral branches is little or nothing, as in woods or groves, then the top branches mightily prevail; but when in a free open air, the perspiration and attraction of the lateral branches come nearer to  
an

an equality with the top, then is the aspiring of the top branches greatly check'd. That the case is the same in most other vegetables, which, when they stand thick together, grow much in length, with very weak lateral shoots.

This observation of Mr. Hales will hold good, and is applicable to every part of my endeavours to convince the labouring farmer of his error in sowing corn too thick.



## A D D E N D A

*Tenacious PASTE, burning hard.*

THE properties of clays on which their utility depends, as the basis of earthen wares are, when softened with water, they become ductile and cohesive, &c. Pure clay softened to a due consistence for being worked, not only coheres together, but sticks to the hands: In drying, it contracts an inch or more in twelve, and hence is very liable to crack, unless the exsiccation is performed exceedingly slow; in burning, it is subject to the same inconvenience, unless very gradually and equally heated; when burnt, its ductility is destroyed; hence, bricks, &c. In particular it points out, that clay, used as a stopper of water in banks, &c. should be worked very much, but not wet.

*Of*

## Of SEA-WATER.

**H**AVING mentioned salt as a manure, and the large quantity made in the south of France, and exported to the Baltic, is accounted for from hence.

One pound weight of sea-water in the northern part of the Baltick, particularly in the Sinus Bothnicus, yields scarcely  $\frac{1}{4}$  of an ounce of salt.

The same weight of water in the British channel, one ounce.

The same in the Mediterranean and Spanish seas, two ounces. And towards the line a greater proportion.

Hence, the sea-water at Limington in Hampshire being so concentrated, that they can make salt cheaper than at Newcastle, from whence the fuel comes.

Marine acid is stronger than any of those of the vegetable, or animal kingdom, but weaker than the vitrol or nitrous; which acidity is rendered useful as manure, by calcination: Thus the acidity of salt, which in that state is certain death to a green plant, is, by being mixed with an absorbent, see p. 106, become its nourisher.

*Cbange*

*Change of SEED, &c.*

**C**Hange of seed is absolutely necessary, after two years sowing in one sort of ground.

And first, wheat. Change from a strong heavy soil, to a light; and from light land to heavy.

Secondly. Chuse the fullest grain, with the thinnest coat: This is known by weighing one ounce; if the corn runs from 600 to 650 grains, be assured it is a floury kind. If you sow a thick coated or branny grain, you must expect to reap its nature, as much almost as red straw wheat will produce red straw wheat, &c. &c.

Thirdly. Beware of sowing infected, or defective corn, such as smutty, or has under or pepper grains mixed with it.

Fourthly. Take care there are no cockle, rye, poppy, charlock, or any other seeds in it.

Fifthly. If barley, observe the clearness of the skin, avoiding a long small grain.

Sixthly. If oats, you may easily know if the grain be floury, by biting it: the grain may be large, but deceitful; it may have a thick cover or husk, and but little meal. By use, a man's hand weighing of it, will instruct him also.

*Of*



## Of FARM-BOOKS.

**E**Very judicious husbandman will be provided with the following farm-books, namely:

First. A Farm Diary, for every day's transactions and work to be entered into.

Secondly. A Field Post Book, where every Field and its contents are distinctly set down; into which, work done in each field, or cattle fed, is to be posted from the Journal, or Farm Diary.

Thirdly. A Stock Book, where cattle are entered, their cost, killed, or sold, which then becomes debtor and creditor to cattle.

Fourthly. A book of debtor and creditor to each field, be it cattle, corn, hay, &c.

Fifthly. A Ledger, where every thing as debtor and creditor are brought into a general account from the second, third, and fourth books, referring to the respective book, and page, which then becomes debtor and creditor on the whole, to be closed yearly: with other books of less note.

*Observation*

*Observation on the wet Wheat Seed Season, &c. 1770.*

**I**N *Rational Farmer*, remark the 8th, p. 69, 70. is mentioned, “ To sow early both in wet and dry ground, for fear you should not sow the wet land at all, and to establish your corn in the dry ground.”

I am at this time, January 1771, more than ordinarily surpris'd at farmers, relative to so palpable a neglect: one would imagine, that 1768 might have been an everlasting memorial of such omission to be handed down from generation to generation; so many in every part of England having then suffer'd by that rainy wheat seed season.

In the Isle of weight in particular, I can authenticate a loss of four thousand pounds to the farmers on that occasion.

*Rational Farmer* being particularly designed for their instruction, I thought they would have been benefited by the above remark in particular, it being a reminding of so recent an ocular neglect. But alas, it had no more effect, than their late

D d

sufferings;

sufferings; many acres of land are not sown this season, and much that has been sown, was, with the horses above the fetter-locks in water, it having been almost a continued rain since the beginning of November.

I had an opportunity of expressing myself the beginning of October to one of the esteemed oracles of that island, congratulating him on the fine weather for wheat sowing: "Ay, zur, says he, if we had rain; the ground is too dry for sowing wheat." I was very much surprized I must own at this answer, having never before known, that people chused wet weather before they sowed their corn, it being on the contrary, too common a fatality to wait for dry weather, as this, and past seasons testify.

This occurrence led me into an enquiry for such omission, by which I understand, the reason is for fear the grain should lie in dry ground, and malt (as they term it) whereby much of it may perish.

This further leads me to lay open the ignorance of many, in not knowing the use of steeping wheat before it may be sown, in a proper liquid, effectually to prevent the dangers grain may meet with



with when committed to the earth; namely, that it may be so replete with vegetating power as immediately to grow on being covered, &c. See page 132, and *Rational Farmer*, page 73, line 1 to 12. I say to lay open such ignorance: they think that flacking a little lime with sea-water, or salt and water, mixing this up with the grain, and immediately sowing it, is sufficient.

Hence it occurs, since advice nor ocular demonstration has no effect on such neglect of duty, whether a law of a compulsory nature may not be useful in this case, (as well as many others) to move and constrain, where the publick good is concerned.

In Ireland there is a law to oblige the holder of land to sow a certain quantum of wheat, out of a certain quantity of land under tillage. To compel the planters of potatoes to lay dung on grass land, broke up for that purpose, on which the potatoes are to be laid. In short, there are both here as well as in Ireland, many such compulsory laws. This law may be framed, that no man should sow any wheat after the 30th day of *November*, under a penalty of ——— for every acre so sown: this restriction would amount to a compulsion, because,  
the

the tiller would be obliged in his own defence to begin sowing early for fear of the heavy penalty.

In short, late sowings making late harvests ; and the indolent state the farmer assumes when harvest is saved, being in a sort of stupidity or unthoughtfulness for a full month afterwards, requires a spur.

I must beg leave to repeat neglect of duty. Don't tell me, that you will sow your wheat at such time as you please ; that the land is your property ; and if you pay your rent it is not any person's business whatever, in what manner, or when, you sow it.

It is granted that the property of the land may be yours, but when such trust is abused, whereby it becomes a publick nuisance, or injury to the community, they have a right to interfere in this, as well as in many other publick cases.

Can there be a greater nuisance to the publick than a man's holding of land, and withholding from them by wantonness and neglect, the produce it would give ; thereby bringing on distress and calamity to a whole nation ?

I say, it is wantonly neglecting a duty : such we owe to God and man : and the authoritative power under God, (to see justice done to all his grieved creatures)

creatures) has an undoubted right to take the premises under its inspection.

The man who takes on him the tillage of land, becomes a trustee to the publick for its produce: and when man abuseth that trust, a court of judicature ought to take cognizance against him in behalf of the publick.

Why is a bounty granted, by so high a court, on exportation of wheat, when at a certain price? but to stimulate the farmer that he may thereby be doubly diligent in every process to obtain a quantity. Shall this be done, and suffer the farmer to neglect his duty so notoriously?

Much may be said on the expediency of parliamentary participation, which I shall leave to abler hands to illustrate.

*Numbers of Grains in an Ounce.*

It may not be amiss to acquaint the good husbandman what number of grains go to one ounce of the following sorts, by which he may more readily know what quantity it will take on one acre, at the distances a subjoining table sets forth page 207.

Merchantable.



Merchantable.	A medium number per ounce.
Wheat from 600 to 800	700
Barley from 640 to 840	740
Oats from 770 to 970	870
Flax seed - - - - -	5038
Lucern seed - - - - -	13600
Turnip cabbage - - - - -	10400
Turnip - - - - -	10400
Cabbage - - - - -	10400
Rape seed - - - - -	10400

PRICES of the following SEEDS in 1770.

Best red clover, 40s. per Cwt. nearly 4d. a lb.  
 Lucern, 4l. 4s. or 9d. a lb. Sainfoyn, 3s. per  
 bushel. Rye-grass, 2s. 6d. per bushel. Buck-  
 wheat, 3s. per bushel. Trefoil, 30s. per Cwt.  
 Best Norfolk and Tankard turnip, 1s. per lb.  
 Large Dutch cabbage for black cattle, 4s. a lb.  
 Scotch kale, for same use, 5s. a lb.

TABLE of the number of PLANTS a statutable acre  
will take according to the under distances.

Dist. of rows. Ft. in.	Dist. in the rows. Ft. in.	No. of plants.	Dist. of rows. Ft. in.	Dist. in the rows. Ft. in.	No. of plants.
0	6	0 6 174240	3	6	0 6 24892
		1 0 87120			1 0 12446
		1 6 58080			1 6 8297
1	0	2 0 43560	4	0	2 0 6223
		0 6 87120			2 6 4979
		1 0 43560			3 0 4149
1	6	1 6 29040	4	6	0 6 21780
		2 0 21780			1 0 10890
		0 6 58080			1 6 7260
2	0	1 0 29040	5	0	2 0 5445
		1 6 19360			2 6 4356
		2 0 14520			3 0 3630
2	6	0 6 43560	5	6	0 6 19360
		1 0 21780			1 0 9680
		1 6 14520			1 6 6454
3	0	2 0 10890	6	0	2 0 4840
		2 6 8712			2 6 3872
		0 6 34848			3 0 3226 6
3	6	1 0 17424	6	6	0 6 17424
		1 6 11616			1 0 8712
		2 0 8712			1 6 5808
3	0	2 6 6969 6	6	0	2 0 4356
		0 6 29040			2 6 3484 8
		1 0 14520			3 0 2904
3	6	1 6 9680	6	6	0 6 17424
		2 0 7260			1 0 8712
		2 6 5808			1 6 5808
3	0	3 0 4840	6	0	2 0 4356
					2 6 3484 8
					3 0 2904

EXAMPLE.

## E X A M P L E.

How much wheat will it take to plant an acre of land at six inches distance in rows, and row; that is, 6 inches square. By the first article in this table 6 inches by 6 produceth 174240 plants; and merchantable wheat at an average or medium 700 grains to one ounce. Divide 174240 by 700 gives the weight in ounces, this being brought into pounds, are 15lb. 8 ounces, 14 drams, 6 tenths.

Again, how much turnip seed will fill an acre of land at one foot distance of rows, and 6 inches in the rows. You see by the table those distances will take 87120 plants, which divided by 10,400 as per merchantable seed to one ounce, it will give the weight in ounces, viz. 8 ounces, 6 drams and a small fraction.

By the same rule, all the rest may be found at any of the given distances.

Wild oats, and some other weeds appearing among corn unexpectedly to the farmer, the cause of which having not been much touched by writers on agriculture, I shall take the liberty to mention something on that head, as I flatter myself it may give some instructions as well as amusement to the industrious.

An



An acquaintance of mine having a profitable farm, and corn bearing a high price for some years, like his neighbours, was not contented with three quarters of his land under tillage; but ploughed up old meadow land that had been such during the earliest knowledge of the oldest persons. One field, (the finest in the farm) consisting of near twenty acres he broke up; for eight years he had large crops every year of one sort of grain or another without any assistance of manure, of any kind whatever. At length, wild oats began to appear among the corn; the second year of such oats they were so thick that the crop was rendered useless.

To reduce which he winter fallowed the field, and the summer following ploughed it up six times, harrowing it after each ploughing; by this manner of tilth, he seemed assured of success, as well as a large crop of wheat the ensuing year, to which it was to be sown. The consequence was a poor crop of wheat, and as large a crop of wild oats as perhaps ever grew.

To this I must observe, that the farmer drove his bountiful land too much (as he himself observes) not knowing whether the farm would be continued to him; and so exhausted it of all nutriment, leaving it as it were a *caput mortuum*.

E e

His

His manner of intended banishment was not less absurd; the seed being in the land, his often moving it answered no other purpose but to keep them alive, and as it were always ready to germinate on the first resting of the plough.

Under such circumstances, the most probable method to eradicate, would be to plough and harrow the ground down in March; in May following the wild oats them would be high enough to feed a large flock of sheep; as soon as eaten down plough it up again and harrow as before, which I suppose, to be the beginning of June, when another crop would soon appear; which eat down as before: this second feeding would be the end of July, at which time plough, harrow, and feed down again the beginning of September; by which time most of the seed would (by these three opportunities given it) be grown and destroyed. Immediately plough it up again and lay it under a veer and ridge fallow during the winter, which will expose the yet unvegetated seed if any, to the field birds; and enrich the land much by the winter's effect.

Here I would not stop, unless I were sure I had obtained success; but proceed in March as before, and continue the former summer's process if I found  
the

the destruction was not complete: if completed, sow the land to turnips in June, and pen them with sheep in August, and then sow a crop of wheat, not more than one bushel to an acre; which in all probability will, with the various sheep feedings, amply repay.

Says the curious, how does wild oats come so plentifully into land without their being sown, or had lain in the ground previous to its being broke up?

I answer. How this, and other like phenomena in nature are effected, seems to be a secret in nature; as in the above, as well as many other such, no seed could have been in the ground: eight years sowings, and none appeared, is self evident none were in the ground during that time; and the ground, (till near that period) had produced good crops, and of course had also continued till that time in good heart; by which it seems very clear, that poverty alone had been the cause of this appearingly unnatural produce: it being also well known such has often been the case, and did appear in more of the fields in the same farm, from the same hard driving the land.

That wild oats are often found to grow immediately on poor soil being exposed to the air, six or seven



seven feet deep is well known; and where no seeds could have been scattered, is also as certain. And if earth taken from a depth that never was opened since the deluge, and kept in such a situation that wind could not waft any seed to it, weeds of various kinds will soon appear on exposing it to the light of nature.

Some there are of opinion, that such spontaneous produce is originated in the earth, without any natural seed being therein; as many plants are generated as it were, having no seed, or at least invisible if any: such as mushrooms, polypody, mistletoe, &c. and the *fungus porosus crassus magnus*; some growing on stones, and clefts of rocks, others on trees, &c. Whilst other naturalists are of a contrary opinion, and that no plant can be formed but from some natural cause, either from seed, root, or other matter, as the coral, &c. As to those plants which appear to float with the water, their manner of growth is somewhat anomalous: M. Tournefort has shewn that all plants do not strictly arise from seed, but that some instead of *semen*, deposite or let fall a little drop of juice, which sinking in the water, by its gravity reaches the bottom, or some rock, &c. in its way; to which it sticks, strikes  
root

foot, and shoots into branches: such is the origin of coral.

Monf. Perrault fuppofes a general generation of feeds from the creation of the world: He maintains that there is not properly a new generation: that what we call generations, are only augmentations and expansions of the minute parts of the bodies of feeds, fo that the whole fpecies to be afterwards produced, were really all formed in the firft, and inclofed therein, to be brought forth and difclofed to view in a certain time, and according to a certain order and oeconomy.

Dr. Garden fays, it is moft probable, that the *ftamina* of all the plants and animals that have been, or ever fhall be in the world, have been formed *ab origine mundi*, by the almighty creator, within the firft of each refpective kind. And he who confiders the nature of vision, that it does not give us the true magnitude, but only the proportion of things; and what feems to our naked eye but a point, may truly be made up of as many parts as appear to be in the whole univerfe, will not think this an abfurd or impoffible thing. *Mod. Theor. of Generat.*

The origin and production of mushrooms has extremely puzzled the botanifts; how a plant  
 fhould

should be produced without a seed is a mystery; and yet the best microscopes are not able to discover any appearance of a seed; and the manner of cultivating this plant, seems to make it the more probable that it has not any. This brings on a small digression.

A very curious account of their culture is given by M. Tournefort in the memoirs of the royal academy; who says, all the secret of bringing up mushrooms speedily and in abundance, consists in ranging balls of horse-dung about the bigness of the fist, in lines, at the distance of about three feet from each other, and at the depth of one foot under ground, and covering these over with mould, and that again with horse-dung. If this be done in April, in the beginning of August the pieces of dung will begin to whiten, and grow mouldy, being covered all over with little hairs or fine white threads, branched and woven about the straw whereof the dung is composed. The dung now loses its former excrementitious smell, and spreads an admirable odour of mushrooms. Adding, mushrooms then are nothing else but the produce of what we call the mouldiness of horse-dung. But what analogy is there between these two things? Or how should so artful and delicate a structure as  
this



this plant is of, result from the mere fortuitous concourse of a few juices, differently agitated?

M. Tournefort however seems to be of opinion, that the seed of mushrooms, as well as many other sorts which cannot be discovered, are scattered throughout the whole earth. That on his knowledge, where the stubble is burnt, as in Provence, Languedoc, and the Islands of the Archipelago, there arise great quantities of black poppies in the first autumnal rains, which disappear the year following; so that they are never found but on burnt lands. And we know, that after the burning of London, the ground, as far as the fire reached, shot up with vast quantities of *Erysimum latifolium majus glabrum*.

Dr. Lister seems to think he has even discovered the seed of mushrooms, and instances in the *fungus porosus crassus magnus*, the texture of whose gills is like a paper pricked full of pin holes. These gills, he makes no doubt, are the very flower and seed of this plant. When it is ripe the gills are easily separable from the rest of the head, each seed being distinct from the other, and having its impression in the head of the mushroom, just as the seed of an artichoke hath in the bottom of it: the bigger end of the seeds is full and round, and they

they are disposed in a spiral order, like those of the artichoke; and the same, he thinks, will hold of all other Mushrooms, however differently figured. If it happen that these, when sown, prove sterile, and do not produce their kind, it is no wonder, there being whole genus's of plants, that come up, and flower and seed, yet their seed was never known to produce plants of their kind, being no more than a barren volatile dust, as that of all the orchides, or bee flowers, is said to be.

With great deference to the ingenious writings of those naturalists, I must observe, that the object of those results appear to me to be yet undiscovered. I am of Mons. Perrault's and Dr. Garden's opinion, that there is no new creation: believing, that the principle flamina of every plant was formed at the creation of the world; that these wonderful phænomena in nature are not produced by any miraculous act, but are germinated from various circumstances in nature, as smells are to our senses produced from various causes.

The wild oat is not miraculously produced, but from an original matter in such soil where they do appear; poverty of ground, being adapted to that genus, some particles of which becomes perfected to  
seed

seed fit for germination. I say, in such soil as they do appear in, as it is not so in all impoverished land, as all impoverished land has not that matter in it, more than one soil is another.

That minutiae lying in the earth till the time comes according to their nature to be exposed from the mother womb to view, is not more impossible than what Dr. Garden curiously remarks on vision; or to be thought more wonderful than Mons. Tournefort's account of the produce of black poppies, in some countries, after burning the stubble. The origin is in the ground, and according to the various genus, various are the causes to produce them.

Thus, says that learned gentleman, "As far as the fire of London reached, erysimum, or wild mustard, grew." The seeds were not in the fire of this, or the burning stubble, but the seed, or the origin of the seed, being in the earth, &c. caused its vegetation from those particular causes.

Thus also in respect to Fungus growing out of different parts of trees; the original is in the tree, only waiting for its production, by a putrefaction in part of the tree. And mushrooms are originally in the herb so eat, which being putrified by

F f

passing



passing through a horse, are fitted for vegetation by a mouldiness of the parts : as also those mushrooms which are found natural in different pastures, proceeding from wet and drought ; by which means, a mouldiness in the ground is brought on, suitable to the food of mushrooms, to which they adhere, and are nourished.

But not to travel to the Archipelago for such a phænomena, we frequently see charlock, red poppies, &c. appear in one crop, and none in the next ; these seeds being replete with oil, as well as the erysimum or wild mustard, are protected many years in the earth from injury, till, being exposed within the sun's influence, suitable to their nature, they again appear in a succeeding crop.

Thus, poppies, charlock, &c. being in a crop of pease, soon after the pease are carted, the farmer often ploughs up the ground for wheat to be sown under the harrow ; these seeds being turned to the bottom, few, or none appear in the ensuing crop of wheat ; but by preparing the wheat land for barley, they are then exposed near the surface, which often are hurtful to the barley crop.

When

When such is the unhappy case, through an imprudent course of tillage, the best method is to harrow the ground as soon as the crop may be taken from the field, when the seed will immediately vegetate and grow, which will be destroyed, by ploughing the ground for wheat the end of October.

Let me again intreat and press an observation I made in *Rational Farmer*, p. 24, not to let any filthy weeds be winnowed into the dung-yard; or sieve cleanings in the stable be mixed with stable-dung, that fuel may not be added to fuel to stop a raging fire.

In respect to the opinion of some, relative to perfect seed of wild oats being in the ground originally, I shall just answer, that as I am of opinion no new generation is created, so I am of opinion, that the seed of wild oats are not always perfect in the ground, until they become so completed by an impoverishment of some particular parts of the earth's fertility, leaving adapted parts to expand the embryo matter into a fabricated vegetating substance, or seed.

As the black poppy (mentioned by M. Tournefort) whose embryo fabrication may be in the  
earth,

earth, or stubble, being set a-float by burning the stubble, are there formed into seed, or something similar, not perfecting any; as they never appear (as he says) but on such burnt land, in those places.

Such is the effect of lime-stone gravel laid on the surface of boggy, heathy land, when the water is drained from it, producing white clover, where a plant of it never appeared before.

Such also is the effect of sea-coal ashes when spread on poor pasture land, frequently filling such with white clover.

In respect to lime-stone gravel, it may be observed, that where gravel is found in Ireland, it is of that kind, even the minutest being subject to undergo a calcination into lime; its plenty in many parts of that kingdom, renders it very useful in tillage, where lands are much manured with it\*; these lands abounding with natural white clover, may justly be conjectured to proceed from that cause; and no doubt, has the same effect on such land as on the boggy land, &c. before-mentioned.

\* Rational Farmer, Page 30.



*Of the Expences, Loss of Land, &c. by small Inclosures.*

AS many farmers may not be aware of the loss of land, expence of making, and repairing fences in small inclosures, a table of calculations is submitted to consideration, between small and large divisions of land, from one square acre to fifty.

For Example.

Fig. 1. One square acre, equal to 160 square perch, the side of which square is 12 perch  $\frac{6}{10}$ , or 50 perch  $\frac{5}{10}$  to surround such square acre. See 1, 2, 3, and 4 columns.

Fig. 2. Two acres in a square takes 71 perch  $\frac{5}{10}$  to surround it; only 21 perch more to surround double the quantity of Fig. 1.

Fig. 3. Containing the same quantity of land as Fig. 2, but in form of a parallelogram instead of a square, therefore takes more to surround equal quantities, viz. 24 perch  $\frac{4}{10}$ .

Fig. 4. Containing 4 acres in a square, taking 101 perch  $\frac{1}{10}$  to surround it; being only double to inclose four times the quantity of land. See, Fig. 1.

Fig. 5.

Fig. 5. Contains the same quantity of land as Fig. 4. within the lines of a parallelogram: but as in Fig. 2d and 3d, so in Fig. 4th and 5th, the parallelogram sides exceed the square under an equal quantity, but less in proportion as the parallelogram approach nearer to a square, viz, Fig. 5. being nearer a square than Fig. 3, the difference in Fig. 4th and 5th is but 10 perches  $\frac{8}{10}$ ; whereas, the difference between Fig. 2d and 3d are 24 perches  $\frac{4}{10}$ .

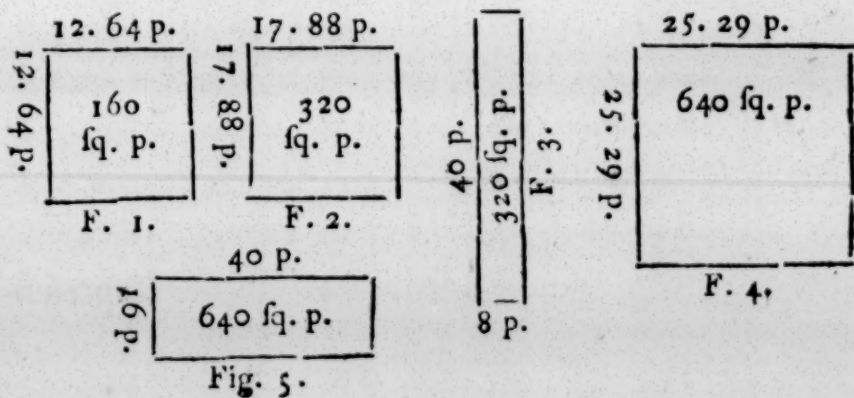
In square figures also, according to the quantity contained, so is the inclosed in a quadruple proportion, to only double the expence; as in the tables, four acres are inclosed with only double the expence of one acre. Eight acres surrounded with double of what surrounds two acres; twenty acres, with double of 5 acres: forty acres with double of 10 acres, &c. In the same proportion is the loss of land, keeping fences in repair, and harbouring birds and vermin.

Methinks I hear it said, "This proportional difference we have not known before." To such, I answer, I am made more than happy by giving the hint.

T A B L E

T A B L E.

		equal to Perch.	Side of the square in perches.	Perches to surround.
F. 1.	1 acre in a square.	160	12. 64	50. 56
F. 2.	2 acres in a square.	320	17. 88	71. 52
F. 3.	8 perches by 40 p.	320	- - -	96. 00
	3 acres in a square.	480	21. 90	87. 60
	12 perches by 40 p.	480	- - -	104. 00
F. 4.	4 acres in a square.	640	25. 29	101. 19
F. 5.	16 perches by 40 p.	640	- - -	112. 00
	5 acres in a square.	800	28. 28	113. 12
	20 perches by 40 p.	800	- - -	120. 00
	6 acres in a square.	960	30. 98	123. 92
	24 perches by 40 p.	960	- - -	128. 00
	7 acres in a square.	1120	33. 46	133. 84
	28 perches by 40 p.	1120	- - -	136. 00
	8 acres in a square.	1280	35. 77	143. 08
	32 perches by 40 p.	1280	- - -	144. 00
	9 acres in a square.	1440	37. 96	151. 84
	36 perches by 40 p.	1440	- - -	152. 00
	10 acres in a square.	1600	40. 00	160. 00
	40 perches by 40 p.	1600	- - -	160. 00
	15 acres in a square.	2400	48. 98	195. 92
	20 acres in a square.	3200	56. 56	226. 24
	25 acres in a square.	4000	63. 24	252. 96
	30 acres in a square.	4800	69. 28	277. 12
	35 acres in a square.	5600	74. 83	299. 32
	40 acres in a square.	6400	80. 00	320. 00
	45 acres in a square.	7200	84. 85	339. 40
	50 acres in a square.	8000	89. 44	357. 76





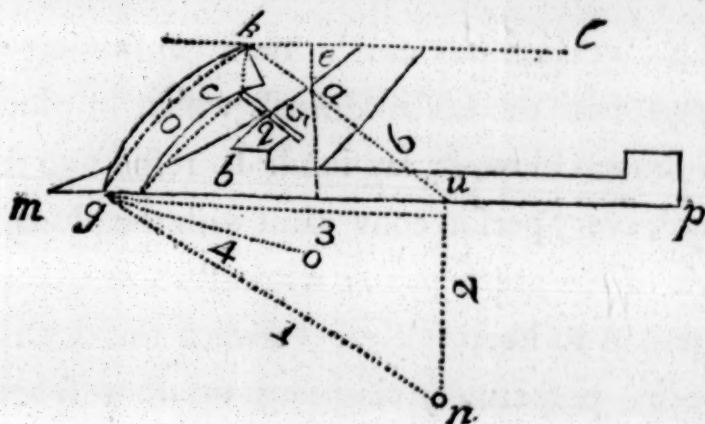
*A new Improvement on the Coulter of a Plough.*

**A**N industrious man, servant to Mr. Devenish of the Isle of Wight, after many ideas how to form a coulter, so that the stubble may not gather, and choak up the plough against the coulter, between the surface of the earth and the plough beam, thought of one to be fastened to the land side of the share, rising up a little above the gange (as they call it) or tilth of the ground, leaving the space open between it and the beam.

After many trials, at length it was brought to answer the end designed, which I have here delineated; observing, that in whatever shape the coulter and share may be formed, the point and cutting part should be well steeled.

Represen-

Representation of the land side of the Share, with  
the improved coulter, welded on at g.



## REFERENCES.

d, The sheath, on the point of which the socket share b, goes.

*c*, The circular coulter well steeled, and sharp; the convex part being one inch forwarder than the wing of the share. The coulter is welded to the share on the land-side, and stands in a line with the breast of the plough, *e*, and the thickness of the coulter to land of the share. The top of which coulter, *k*, ends at a perpendicular with the sole of the share, 8 inches, intersecting a parallel line, *k*, *l*, as in the figure. A mould should be formed for the smith to work by. To find the centre for striking out the mold. First, draw an indefinite line as *m*, *p*, from any part, as at *g*, measure off 18 1-4th inches as *g*, *u*, on which raise a perpendicular, *u*, *n*, at *u*, and measure off 10 1-4th inches, which gives the centre of the radius *n*, *g*, at *n*. Parallel with *m*, *p*, draw a line at 8 inches

**G g**

distance,

distance, *as, k, l*, from which centre, *n*, draw the dotted curve, *g, o, k*, intersecting, *k, l*, at *k*. This gives the convex curve. The concave curve is given by the breadth of the coulter.

This invention has much merit, answering every purpose of the husbandman's wishes in ploughing stubble, fallow, or lay land. In respect to stubble land, every person conversant with the plough, is sensible of the great trouble wheat stubble gives the ploughman to keep it clear between the earth and the beam, perpetually clogging up that space by the coulter's stopping it before the mould board can act to carry it off with the turning earth, be it in dry, or wet land : But more particular is the trouble and loss of time in strong heavy land, than where the land may be drier : Add to this, the uniform covering all the stubble ; and, what is still more remarkable, no improvement on a plough ever took with the farming tribe so much as this coulter has. May God continue them in the right way.

However, on due trial, I found the coulter stood too upright, and if thrown more slopping  
towards

Note. If the share be rounding like the Norfolk share, the coulter should be set back about two inches.



towards the breast of the plough with that curve, it would be too near. I therefore prevailed on a friendly farmer to have the convex side of the coulter formed from a radius of 21 inches, instead of  $11\frac{1}{2}$  inches, which then formed the dotted convex curve *o*, which gives an easier form for less resistance, as every minute of a degree approaching nearer to a perpendicular, would make a greater resistance. And in order to keep this coulter more steady in stubborn land, I found a brace nailed to the sheath, and butting, with a nick or notch in it against the coulter, as *q*, would be of use.

Here I pray to be understood, that by this I do not mean to lessen the merit of the inventor, but heartily wish every improvement, and improved improvement, may be more improved on.

#### *Of HOVEN SHEEP.*

**I**N p. 4, mention is made of sheep being hoven by feeding too long and greedily on red clover\*. Another malady having lately appeared to my knowledge on ewes after lambing, I shall take the liberty

\* When that proves to be the case, I refer to p. 149. for a remedy.

liberty to describe the disorder, and manner of cure.

As soon as the ewe has yeaned, a swelling on one side of the udder appears, accompanied with a darkish purple colour swelling towards the navel, and on to the breast, which then causeth immediate death. To prevent which, it was advised, to take the disorder in time, by examining the ewes for a few days after yeaning; and, on the first symptom, to put a rowel in the ewe's belly, a little before the udder, putting a longish bit of bacon with the rowel, as soon as the suppuration took place, rubbing, or stuping the udder twice a day with hogs-lard, bean-meal, and camomile flowers boiled together in urine, letting the poultice continue to the udder after each stuping.

Great barley, winter or square barley, bear barley, big or bere. This grain being of four or six rows, is also called four or six row barley, to distinguish it from the common, or two row barley.

By the Germans spelfs, spelt, or spelta, as in Italy, France, and Flanders, under the genus of a kind of wheat.

Spelt is further defined by the name of ador, a grain for sacrifice.

In

In England it is called by the first names. In Ireland bere.

I have been a little particular about the name of this grain, as it is not known in all parts of England \*. It is certainly a genus of barley, and not wheat, although it may pass in Italy, &c. under that appellation. As writers differ in respect to its being one and the same grain. I have given a description of spelt, as we have it in Salmon's herbal.

#### ZEA, or SPELT CORN.

This has a large strong stalk of a brown colour, and the head or ear thereof is large, and of a brown colour also, with four sides, or rows of corn, so that it seems to be four square, armed with awns. The colour of the grain within is paler than red wheat, the corn itself being much of the same fashion, but plumper, or larger. The meal or flour of this makes admirable good white bread, cakes, &c. but it is scarcely so white  
as

\* So little, that no return of it is made to Mr. Cooke among the monthly return of grain, by authority of parliament.—Note, the return from Scotland in April 1771, the average prices of barley was 2 s. 5 d. per bushel, and bear 2 s. 3 d.



as the others, and seems to be a species between wheat and barley.

Great barley may be sown in February, March, or beginning of April; or, at the end of the wheat sowing season, from one and an half, to two bushels per acre. It stocks, or plants, much in good ground, sowed early, and not too thick, often producing two load per acre. A friend of mine in the Isle of Wight, told me, he sowed half a perch with the six row kind the middle of April, in a barley field, (at the time he sowed the remaining part with common barley) of the six row kind. It ripened with the barley, and, though sown so late, the half perch produced half a bushel, being at the rate of twenty quarters, or 4 load per acre.

Were the tiller of land to sow it in good barley, or reasonably dry wheat land, its value would be more acknowledged; as, the yield would be double, at least, of the best crop of barley, sowing it on one ploughing of wheat stubble, or land otherwise prepared as circumstances may direct.

It cannot be said, that introducing this genus more into culture, would lessen the quantity of common barley; on the contrary, it would be the means of enlarging the quantity for malting use :

use: As half the quantity of land, under common barley used for pigs, sown with this grain, would fatten the same number; and of course, half the land now producing barley for that purpose would be added to the malting quantity.

In Ireland it is cultivated for malting in general, as well as much used in the distillery branch; procuring from thence, as also from oats, a spirit called whisky. And although it would make good bread for the common people, yet they prefer oatmeal food before it; and, in particular, when the oats are kiln dried pretty high, it then having a stronger flavour.

### *Of RYE.*

**H**AVING only mentioned rye in the former part of this treatise, as falling in with spring food for ewes, &c. shall just mention, that there is a great loss in many parts of the kingdom for want of it.

By the return now before me, (made to Mr. Cooke) out of forty counties, only sixteen propagate rye, or sold in such markets; one of which,  
Notting-

Nottinghamshire, the medium price for one month was 4 s. 6 d. per bushel, and the medium for wheat of that month 5 s. 11 d. In Northumberland, rye 3 s. 6 d. wheat 4 s. 3 d. per Bushel, Winchester measure \*.

It may be said, their land is more fit for rye than for wheat; that, in part, I shall grant; but, does that say there is no such land where it is not cultivated: I shall say, such land there is in every county, waiting impatiently for its master to employ it to its proper use.

Rye land in England is understood to be a light soil; and even, if rye did not do well in any other soil, yet much of that soil is converted to poor crops of barley, to yield one fourth, and sell at half the price of rye: and much poor strong land not ploughed up at all, because it wont produce wheat, which, if well tilled would yield large crops of rye.

What, says the farmer, shall I do with rye? Part of my farm may produce more profit by it than by other corn; but no person will buy it for food in this part of the country; they will not mix  
rye

\* February 1771.



rye and wheat together; no servant, labourer, or even the poor of the parish, will eat maslin bread.

To such I answer, they are better fed than taught, and the feeder the most blameable; but if they will not make use of rye to feed themselves they cannot fat a hog with barley as cheap as they can with rye.

If used as part of bread food, it would add almost double to wheat exportation, without lessening or increasing the quantity of wheat land. This is no paradox; it may indeed take part of the poor barley land away, but that trifle is more than four fold made up by propagating bere barley.

Boggy land, scarce fit for any other grain, when the water is drained off, will produce an equal crop of rye, with any rye land so called, as will also dry mountainous land, where it can be tilled. In North Wales, the difference between wheat and rye being only 10d. per bushel, wheat at 5 s. 5 d. rye 4 s. 7 d. \*, which shows the quantity of rye eat and produced from their mountainous hills.

As my intention to inform does not proceed from adulation, considering not the man but the

H h

matter,

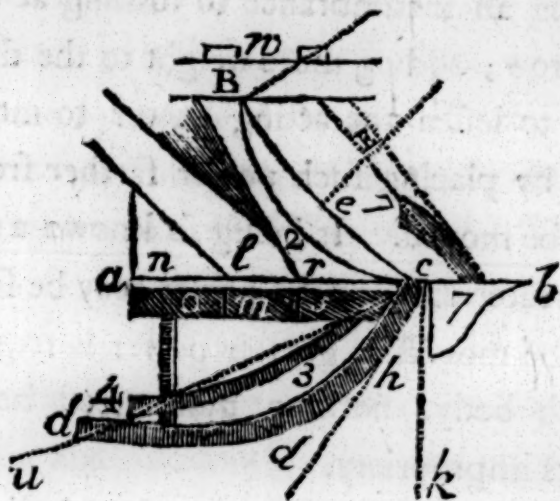
\* In February 1771.

matter, shall therefore take upon me a small discussion on the Rotherham, or Surry plough, as now called.

I have on every occasion that offered, recommended that plough, having often seen its beauty in operation with much pleasure. One being lately introduced into the Isle of Wight under that name, and I being there, was requested to see it, as the people's expectations were a little flattened.

I must acknowledge, on seeing it my surprise was not less than theirs: on examining the plough, I found the principles of it was the same as I had before known; but the length of the beam, the flatted breast, and the ponderous long earth board, seemed to me as a burlesque on that implement of utility. As I hope to see the principles on which the Rotherham plough is formed, more and more improved, (I should add, instead of being abused) I cannot help going into an explanation of this new introduction, pointing out its faults, and redressing them by mechanical observations, as well as a delineation for ocular demonstration.

*The*

*The incorrect ROTHERHAM PLOUGH corrected.*

*a, b, d, d*, shews the under part of the structure: the bottom of the head piece *n*, being *o*: the handle *l*, being *m*: the sheath *r*, being *s*: and the mould board, *c, d, d*: with the concave edge of the sheath *2*. This is the structure as it came into the Island.

*c, u*, an angle equal to  $24^{\circ}$ . the correct plough.

*c, h*, an angle equal to  $58^{\circ}$ . the incorrect plough.

*a, b, w*, part of the profile of the plough.

*b, d, d*, bottom or plane of the plough incorrect.

*b, c, 3, 4, a*, bottom or plane of the plough correct.

*e*, from a radius of 5 feet 5 inches, to the correct plough.

*2*, from a radius of 1 foot 6 inches and 1-4th to the incorrect plough.

*B*, part of the beam.

My first observation is the length of the beam, being 6 feet, 6 inches. Secondly, the curv'd breast of the sheath, at *2*, in the profile, and *c, h*, in the plane. Thirdly, the ponderous mould board *c, h, d, d*, each of which I shall speak to.

First,



First, The length of the beam being uselefs as to work, is an incumbrance to turning at the end of the furrow; adding more weight to the draught, as well as to lessen the acting power to move this machine, by placing such power farther from the weight to be moved. It being so known a maxim, that the greater distance the power may be from the body to be moved, a greater power is required to move such body, nothing more need be urged to show its impropriety.

Secondly, The flat, blunt, or obtuse angle forming the breast of this plough with the mould-board; as 2, in the profile, and  $c, b$ , in the plane. The direction of this mould board which forms the breast of the plough, being the concave edge of the sheath 2, and departing in an obtuse angle from the line of the land side,  $a, b$ , at  $c$ , to  $b$ , equal to 58 degrees, occasions a great resistance.

This being also as notoriously known as the former, yet I must speak a little more on this observation.

In mechanics, the resistance of solids is the force wherewith the quiescent parts oppose the motion of others contiguous therewith. As the resisting, and resisted parts, that is, the moving and quiescent bodies, are only contiguous, and do  
not

not cohere; i. e. where they constitute separate bodies or masses; such as the resisted plough, and the resisting or quiescent earth, &c.

This, I may say, is what M. Leibnitz calls resistance of the surface, or properly friction; the consideration whereof being of the last importance in the doctrine of machines.

Therefore, the least resistance the moving parts meet with from the quiescent, the less will be the friction; and of course also, the more acute the moving body is, the less resistance will that body meet with.

Hence, as the perpendicular stroke, or impression is to an oblique one as the whole sine, to the sine of the angle of incidence; and the sine of a greater angle is greater, and that of a lesser less, the friction is the greater, as the line of direction approaches nearer to a perpendicular.

Thus the angle  $c, b$ , being nearer a perpendicular,  $c, k$ , than the angle  $c, u$ , so the resistance  $c, b$ , is greater than the resistance  $c, 3$ ;— $c, b$ , being the resisting mould board departing from its edge  $z$ , of the improper plough; and  $c, 3$ , the resisting mould board departing from its edge,  $e$ , of a proper plough\*, as in the profile  $a, b, B$ .

Thirdly,

\* See the Lomax plough, page vi.

Thirdly, As the angle  $c, 3$ , equal to  $24^\circ$ , makes a complete subversion of the furrow, so not only the resistance made by the obtuse angle  $c, b$ , equal to  $58^\circ$ , but the remaining part of the mould board by its prominent swelling between  $b, d$ , causes a hard rubbing or friction against the subverting earth unnecessarily, causing also a lodgement of earth against the breast  $c, b$ .

To this observation I shall also add, that as the weight of a body moved on another is increased, so is the friction. Thus, the friction of two bodies are, as the weight, or force wherewith they bear on each other; or are charged with a greater weight.

This is another fault in the plough I have been discussing. When I lifted it at the handles, the weight was no small surprise; the farmer had much reason to complain at the labour of turning at the end of the furrow, the ground polished by its weight, and the horse impatient to get rid of his stranger. The ponderous earth board†  $2\frac{1}{4}$  inches thick of oak,  $11\frac{1}{4}$  deep, together with one foot 6 inches longer than was at all useful, (as  
every

† The earth board  $c, 3, 4$ , is only one inch thick, exclusive of the plate in the proper plough.



every part from  $d$ , to  $d$ , was lost in use) the subversion ending at  $d$ .

Here I would wish to be understood, that my remarks are not pointed against any particular person: but whomsoever that person may be who thus abuses the best principled plough yet known, I would advise him to be more cautious how he impose on the publick; nay, it is not only imposing, but destroying publick utility. Such a plough of fame going into a partial country, to people big with expectation of seeing something miraculous, intirely strengthens their former ideas, that what they frequently hear doing in other places preferable to their mode, is a mere fiction.

To the side, or profile view of the plough,  $a, b, w$ , I thought it not improper to affix the circular coulter,  $7, 7$ , that its formation may be more clearly understood in respect to the common coulter,  $E$ . This circular fixed coulter may be made to cut a depth of 10 inches, if necessary, as well as 8 inches. And as the whole thickness of this coulter joining the share, is to be on the land side of the share, so the edge of such coulter should be feathered off to the land edge from the furrow side wholly, and not to the middle from each side alike, as is done in the common coulter.

There

There is one inconvenience attending this coulter when welded on to the share, as it cannot be so easily repaired when out of order. To remedy this, clasps may be made to it, so that the coulter may be put on and taken off at pleasure.

As simplicity in the best utensils carries with it its own recommendation, so complicated work bespeaks the reverse; and perhaps in nothing more so than in the useful plough. Both ancient and modern of this complicated, unweildy, expensive plough, we daily see in the course of a few days traveling. What shall we attribute this to, but custom and self-interest? The latter increasing ponderous timber and iron, thereby to enhance the price, that a greater profit may be proportionably obtained; and the farmer receives them as the plough of the country. Are the farmers so flush of money that they can throw away eight or nine pounds on a complicated plough\*, when they may have a plain, durable, and irresistible one, equally divested of its friction, for forty shillings?

Such is the plough page vi, of this treatise: no plough yet known, when the friction of the plough  
on

\* Such as a late patent plough; the perpendicular wheel of which is the only part that claims any merit.

on the furrow is removed by the perpendicular wheel being fixed in the chamber or inside, answers every purpose more fully : and I can aver, that this simple machine works with as much ease to the draught as any complicated, expensive carriage plough, that may cost five times as much.

But if the farmer will have a carriage, or two wheel plough, need he go further than the Norfolk or Essex simple ploughs, and put a perpendicular wheel to the chamber to take off the horizontal friction, without which, even in their present state, two horses are the moving powers.

For the satisfaction of the reader, I have given a description of the *Lomax swing* disincumbered plough. The *Norfolk* two wheel carriage plough and its use. See *Rational Farmer*, page 91.

Thus far I hope has agreed with riches and ease to the labourious farmer, and that he is satisfied with the hints offered, tending so much to his advantage. Shall only add, that whatever system in agriculture may be advanced, or utensils recommended; such, and such only can stand the test, where permanency to the earth, cheapest, and most useful simplicity in the utensil machinery, is the basis.



This rigid spring daily admonishing man with repeated lessons to arm against (as much as possible) unforeseen dangers that may befall sheep, &c. for want of due food, forceth my pen once more to press the husbandman to the attention I have before earnestly requested: namely, always to provide for this purpose turnip-rooted cabbage, Siberian borecole, commonly called Scotch kale, rape, &c. for the spring, observing, it is to be much regretted that the second sort is neglected in the garden as well as in the field, no green being of so much utility in either, luxuriantly braving the severest winter.

It will appear still more urging when we consider the uncertainty of spring vegetation, either in natural, or artificial grass. On the 10th of April 1769, Lucern was 12 inches in height, but on the 20th of April 1771, in the same field, and under the same culture, vegetation scarcely appeared; and none but God knows when, or how often we may be thus visited.

The lamentation of the country, and distress in the metropolis on account of the high price of provisions, the cause of which (as it appears to me, with Gods assistance, I intend to lay before the publick)

lick) is so alarming, that I am convinced such will plead in excuse for this redoubled urging so necessary a matter.

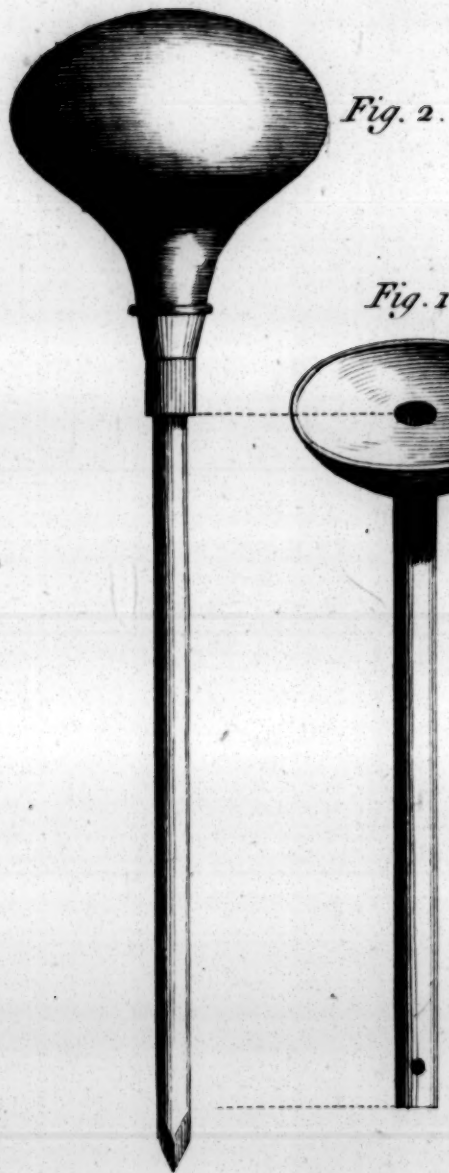
And beware, that succeeding fine weather do not delude your resolves, but in the the midst of prosperity, prepare against adversity.

P O S T-









*Fig. 2.*

*Fig. 1.*

## P O S T S C R I P T.

**H**AVING given a short account of hoven cattle occasioned by feeding improperly on clover, and how to relieve such, &c. page 149. I must however, beg leave to intrude longer on my readers patience, while I give a fuller and more explicit account of that disorder (from what has since fallen within my knowledge) as it so often proves fatal to the poor beasts, and consequently a very great loss to the industrious farmer.

The known advantage of clover, lucerne, and other kinds of grass equally succulent, in fattening cattle, has made the accounts of the various improvements in their culture, when communicated to the publick, very acceptable to every unprejudiced farmer.

Though the frequent cutting of these species of grass makes it very profitable, yet it is but right to give a caution to those who see it only in that light; for, by being too much in a hurry to put on flesh, to their lean beasts, they frequently  
lose



lose them: the voracious manner in which the cattle fill themselves with this kind of food, generally produces a disease known by the name of *boven*.

The abdomen in this disorder appears greatly inflated, between the short ribs, and the pin or hip bone, but particularly on the near side. There is always a symptomatic fever, in consequence of this distention of the belly; from the very great pressure on the large vessels, those of the eyes appear very turgid, and the looks of the animal become wild, as is usual from the effect of violent pain.

This disease seems to me to be produced from too great a quantity of this succulent food being received into the paunch, which, as soon as digestion begins, and the juices of the plant escape their vessel, the air contained, expanding itself, blows up the stomach to that degree, that not the least air can escape into the intestines; at that time both orifices of the paunch become closed like the mouth of a purse, from the violent distention, and inflation of this receptacle of their food. The effects of this must be violent pain, and a temporary fever, till the pent up air either escapes into the guts, or is let out by an operation.

Though

Though this seems to me to be the most rational method of accounting for this disorder, yet I own I am somewhat puzzled to ascertain the seat of the complaint, for in the account sent to the editors of the *Museum Rusticum* under the signature of a *Devonian*, October 1764, it is plain, that the incision was made only through the common integuments, abdominal muscles, and peritonæum; that, the fetid air immediately rushed out, the beast was instantly relieved, and, soon became perfectly well.

Mr. Wallis\*, though the operation was performed five times on his calf, yet he does not ascertain the depth of the wound made with the pen-knife; and should it be extravasated air in the cavity of the belly, it may, beyond all doubt, be capable of raising the integuments of the flank so high, as to leave the paunch below the reach of a small penknife; there is another reason to believe the paunch was not wounded, as the perforation was made five different times, without any inconvenience to the animal, which I should be apt to suspect would not be the case, if the paunch was wounded so repeatedly.

The

\* Vide, page 151.

The next is Mr. Comber, jun. to the same editors, who says, that there are not any large blood vessels in the part where the operation is usually performed, but that the paunch is wounded by the penknife; that a small orifice is sufficient to let out the confined air, and that, without the help of a tube. I will nevertheless venture to offer my sentiments in objection to Mr. Comber's assertion, that the paunch was wounded; for had it been so, and a very small opening, it could not have been serviceable without a cannula or tube. It is well known, that when a bladder is distended with air, as Mr. Comber observes, a small puncture will empty it, but, then the bladder is dry and out of the body; but if one of the intestines in a living subject, at any time becomes distended with air, as in a *rupture*, by puncturing it with a common needle, a very small quantity of air only can escape, as the orifice in the gut, and that in the integuments, will soon be at a distance from each other.

I have seen a very simple, but ingenious instrument, which a gentleman of great eminence as a surgeon, made use of frequently for the purpose of discharging air from the intestines, in order to return the bowel without performing the operation,  
for



for a strangulated gut; it is a small silver *cannula*, with a triangular steel point; a little above that is a hole or two in the *cannula*, for the air to escape; it is called the *perforating* or *pointed cannula*. I was at first much struck with it, as an useful instrument for performing the operation for the *boven*; but, the gentleman who favoured me with a sight of the instrument, persuaded me against using it in this case, as he said, from the *cannula* remaining in the cavity, as the teguments subsided, the sharp point would be liable to do mischief, and recommended a small *trocar* like that used for tapping in that species of dropsy called *ascites*, as being by much the best instrument for the purpose.

Another account, to the *Museum Rusticum* in 1764, was sent from a person who signs it *G. B. Isle of Ely*. He asserts, " That the blade passed  
 " through the integuments quite into the abdomen;  
 " that there issued out a great gust of wind, with  
 " some water of a redish colour: the bullock  
 " seemed easier, but far from well, for the wound  
 " presently closed up, and permitted no more air to  
 " escape; so that I was under a necessity of stab-  
 " bing him twice more in *different parts* of the  
 " belly."

A gentleman at Wexford, as related by Mr. *Wynne Baker*, is of opinion, that the disease is seated in the paunch, but, his caution in wounding it perpendicularly, to let out the confined air, is ill grounded, as the knowledge of the structure of that viscus immediately evinces, for the fibres not only run perpendicular, but transverse; and I am surpris'd it could escape his notice, if he had eaten tripe as often as I have. He recommends the stab to be made boldly into the cavity of the paunch, but, that the incision should be directed obliquely downwards: So far indeed he is right, if the blade of the knife was long enough, to reach either the larger vessels of the kidney, or intestines; but the distention, that the belly suffers under such inflation, must raise the teguments and muscles so high, as not to hazard injury being done to the subjacent parts.

In respect to the paunch being wounded, or not, by the operation usually performed on beasts afflicted with the *boven*, in my opinion, is far from being determin'd, by the accounts sent to the editors of the *Museum Rusticum*. Some writers positively assert, that the paunch is wounded: this, I suppose, may be a mistake grounded on the examination of the parts of an ox or cow, not labouring

bouring under the disorder when killed, as the paunch is exactly situated where the incision is directed to be made. The violent inflation of the belly, and particular elevation of the left flank, are consequently, strong inducements to believe *that* bowel to be the seat of the disorder; especially, if those gentlemen reasoned as I have done, on the effect of the stomach being suddenly filled with such succulent grass, I make no doubt, but that they were soon confirmed in their idea, of the paunch being always wounded in the operation of stabbing for this complaint.

By the account from the *Devonian*, it is plain that the beast got well, only, by a small incision being made through the common integuments of the belly, through which the air contained was discharged, which was also the case with those I saw the operation performed on.

The letter signed G B. supposed to be a surgeon, is very clear on the subject, as he does not seem in the least apprehensive of mischief from wounding the gut, as he tells you, that the air being contained in the cavity of the belly, the blade of a common penknife cannot reach it; however, he adds, that in case the wind is pent up in the intestine,



testine, even that, must be penetrated before the beast can be relieved†.

The calf that underwent the operation five different times with equal advantage, and no ill consequence, is a very good reason to suspect that Mr. Wallis might be mistaken as to the paunch being wounded by the stab of the pen knife; besides it is certain, that from the calf's drinking its milk immediately afterwards, some of it would have escaped by the incision into the cavity of the belly. It is extremely clear to me, from the account given by *G B.* that the air is always extravasated and contained in the cavity of the belly, for tapping in the usual place did not succeed, but he was obliged to repeat the operation on *different parts of the cavity*; besides, the water discharged, being of a redish colour, confirms the fact, that the paunch was not wounded, as this ichor or bloody lymph is generally found in the cavity of the belly, when the peritonæum has suffered any violent degree of inflammation.

Another observation is worthy of our notice; for Mr. Wallis's calf did not suffer from eating clover, lucern, or any other of those grasses, so replete

† Vide page 154.

replete with juices, but from taking cold; therefore this fact renders our hypothesis a little dubious as to the paunch being the only seat of the disorder; yet, it being air extravasated into the cavity, requires some good reasoning to gain credit: but, in case we fail to convince by this method, we must have recourse to the facts related; where it is evident the air was lodged solely in the cavity of the belly, and on being let out the animal recovered.

Whether the blood suddenly becomes impregnated with this clover or lucern juice, I will not pretend to say, though it is most probable it is; if so, from the pressure of the distended paunch on the large blood vessels the circulation is interrupted, a symptomatic fever ensues, the air contained in the blood is rarified, and, as the vessels of the peritonæum, that usually discharge lymph, for lubricating the surface of the viscera contained in the cavity of the belly, become dilated, not only a larger quantity of liquor escapes the openings, of those lymphatics into the cavity of the belly, but after some time, even blood is mixed with it; and, all the animal fluids we know are loaded with air, the rarefaction of which, when extravasated in the  
preter-

preternaturally heated cavity, may in some measure occasion this inflation of the belly.

I must beg leave, in order to support my hypothesis, to remind my reader that the fever in the calf that underwent the operation five times, was, from lying in the wet†, and taking cold, without having ate the least blade of clover or lucern.

I shall only add one more fact, which is well known to most people; that is, we often hear of people complaining of violent pain in the integuments and muscles of the belly, and by passing their hands over the false ribs from the spine towards the pit of the stomach are sensible of the air passing immediately into the stomach, which, soon becomes inflated, and, the air being discharged by the mouth, they were instantly relieved.

That air pervades the animal, by means of the cellular membrane, is well known, from butchers inflating it to give a plumpness to veal; but how it escapes into this viscus, or that cavity, though the fact is well known, yet, we must own ourselves at a loss to account how it is effected.

The discharge of the confined air being the absolute cure, the *trocar* seems to me to be the properest

† Vide, Dry lying of Cattle, page 38, and note page 151.



properest instrument for the purpose; to explain which, I have added a plate. The Stillet, fig. 2. must be put into the cannula, fig. 1. And thrust boldly through the muscles and integuments in the most prominent part of the swelling, in the left flank but obliquely downwards; and as soon as the want of resistance convinces you of being within the cavity of the belly, withdraw your stillet, and the air rushing out, will best determine the depth of the puncture being sufficient; the cannula\* may remain in some small time, the duration of which must be determined by the animal's being relieved.

Though clysters are certainly extremely serviceable in this complaint, yet they should not ever be given more than milk warm, for on the supposition of air being contained in the intestinal canal, if they are given very hot, it would rarify that air and increase the disorder, for a time; but procuring stools is greatly contributory to the recovery of the beast, when seized with this disorder, and it is well known, that when these grasses purge the cattle feeding  
on

\* About three inches and a quarter in length, and, the size of a large goose quill; and, the stillet about a quarter of an inch longer than the cannula, as appears in the plate.

on them, there is not any danger of their being feized with the *boven*†. And the care of those who bring their cattle to eat it by degrees, and mixed with other food is very commendable, which ought to be continued till such time as the clover passes freely through them, then they may take their fill of any of the succulent grasses.

† Vide, page 5, 149, and 157.

F I N I S.



